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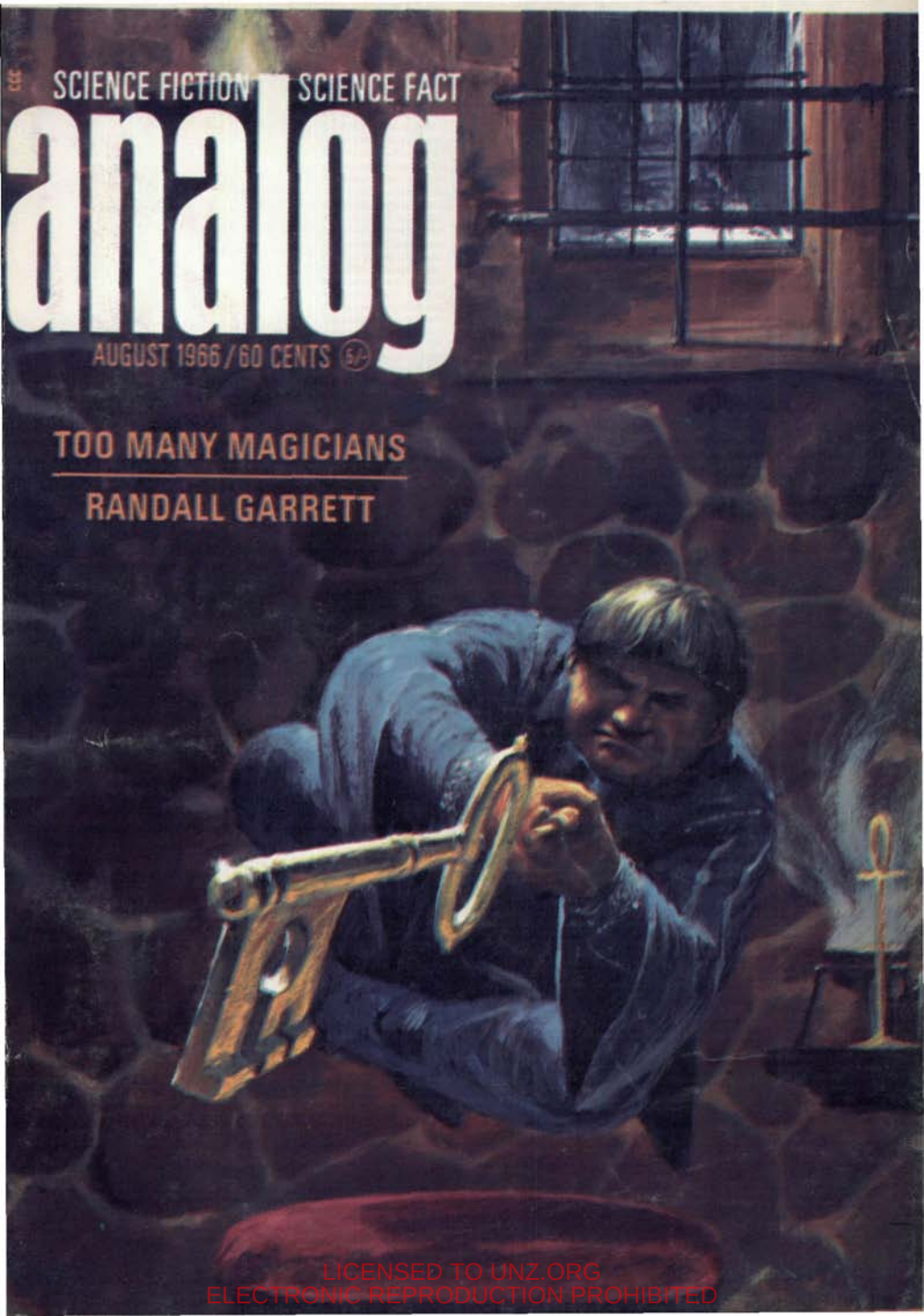
TOO MANY MAGICIANS

RANDALL GARRETT



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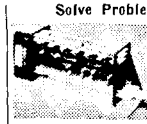

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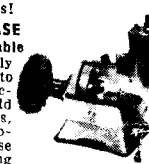

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VOTER REGISTRATION

an editorial by
John W. Campbell

A few years back, a somewhat unusual situation showed up in a small French town; some of the citizens of the town petitioned, most earnestly, to have the majority of the legally registered citizens of the town removed from the voter rolls. As I got the story, the precipitating cause of the petition was that the newly elected mayor of the town was at the time, and had been for some years, carefully locked away in the local institution for the insane.

He had been legally elected by the majority of the citizens of the town, who knew him well—were close, personal acquaintances. Very close; they, too, were safely stashed away in the same institution.

The institution was the provincial asylum—call it the State Institution. Since the inhabitants were citizens of the province, and of the village, were over twenty-one, and not convicted criminals, the French law at the time did not bar them from legal registration in the voting rolls. Since the village was quite small, and the institution quite large, the insane outnumbered the sane on the rolls. Democratic majority rule, therefore, allowed the most popular nut in the laughing academy to become mayor of the town. You know—"One man, one vote," and "all men are equal."

So a minority of the legally registered citizens were petitioning that the majority of the legally registered voters be deprived of their franchise.

Now, if you want to say: "All men *should* be equal!" as a statement of a personal, philosophical belief, that is perfectly proper and befitting. If that is what you truly feel and believe, then it is a real fact that you hold that all men *should* be equal.

But, if you say, "All men *are* equal," you are either ignorant, stupid, or suffering from delusions. There is no known respect—none whatever—in which all men *are* equal. Every measurable characteristic of living organisms—the human organism included—shows a distribution curve of values along any test-axis ever developed, when applied to a population of biological entities. Actually, the Law of Nature involved seems to be a lot broader than that—"identical" parts produced by precision machines also show a distribution curve. At the micro-level, we find a distribution curve of stability among radioactive atoms. If there weren't, like the fabled "Wonderful One-Hoss Shay," a quantity of radium would lie inert and totally unreactive until suddenly all the atoms simultaneously discharged an alpha particle and transmuted to radon.

To express an ideal, as "I wish I

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had a million dollars," is sane enough; to say "I have a million dollars!" and start acting on that proposition means either that you have very considerable wealth, or very severe delusions.

The French instance demonstrates in somewhat extreme form that the requirements of being twenty-one years old, a citizen of the area, not criminal, and generally recognized as "human"—whatever that term may mean!—do *not* establish adequate criteria for allowing an individual to vote.

There are—and long have been—a lot of invalid criteria for refusing an individual the right to vote. Things like religion, sex, skin color, even unpopular political belief. In at least one instance, the fact that a man insisted he had a right to wear a beard.

But the fact that invalid criteria have been used is by no means reason to hold that no criteria are proper.

The no-literacy-requirement situation currently on the books is approaching the level of unrealistic thinking involved in the French situation, where no-sanity-requirement ruled. The fact that the literacy requirement was, indeed, used as a trick to impose a clearly improper skin-color criterion has nothing whatever to do with the matter. In a culture as complex and as highly technical as ours, an individual who has not learned to read and write is as incompetent to cast a rational vote as a man who's a citizen by reason of being locked up in the local spin-bin.

Now note this carefully: The *reason* for his inability to read and write has nothing whatever to do with the matter; it's of no importance whether his inability results from innate mental failure—exaggerated stupidity—or from total lack of opportunity (he grew up on a desert island where there were no books whatever) or because he belongs to some peculiar religious sect which holds that reading and writing are the source of all wickedness. The operative factor is that a man who can not read and write is inherently cut off from a major information channel in the society—and in a society as complex as this, even all available channels are, in fact, not entirely adequate.

A piece of steel alloy, a high-carbon steel, which has been heated and quenched, but not tempered, can *not* be used as a spring. There's nothing wrong with the alloy; it's a first-class melt. But until it has been properly tempered, it simply can not function as a spring. There's nothing against the piece of metal—it simply hasn't had the tempering experience it *must* have to be used in that way.

It can, however, make an excellent file; it just isn't suitable for a particular application.

If the man hasn't learned to read and write by reason of being an im-

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becile, or very low-grade moron—that's a separate, but equally valid criterion for rejection from the voter rolls. The fact that he's "one man" does not mean that he can cast a rational "one vote."

The essential intent of the no-literacy-requirement bill was to prevent that reasonable criterion being used to impose an unreasonable requirement—that the would-be voter have the "right" skin color. And that method of achieving a worthwhile end is strictly on a par with the Prohibitionists' technique for curing alcoholics; prohibit all alcoholic drinks, because some people misuse them.

I have a suggestion that will be almost equally cordially detested by both sides in the dispute—because it's absolutely honest and absolutely unbiased.

We'll have a literacy test worked this way: An electronic computer is programmed with, say, five thousand questions on basic government, citizenship, and economic problems, each of which is a multiple-choice question. On present time-sharing program systems, one computer, with fairly cheap wire tie-in extensions, could handle the business for a whole state. Most states already have accounting computers that could be programmed for the operation.

A would-be voter comes into a booth not unlike a voting booth, sits down, and is faced with one of the computer outlets. When he's sealed the booth, the computer presents him with ten—or twenty or fifty—questions, selected by a random-number mechanism, from the bank of five thousand—or one hundred thousand for that matter—questions which he reads and answers by pushing what he considers the appropriate buttons. The computer mechanism scores him, and if his score is above passing—say seventy-five percent—the computer itself automatically issues him a voting card somewhat like a modern credit card. This card is then used in the voting machines when election-time comes.

If he loses the card, he can't vote till he gets a replacement—and to get a replacement, he returns to the local computer-outlet and goes through the testing procedure again.

Since the computer is not equipped with any sensors for anything but the questions-and-answers, it can't have any bias on race, religion, sex, or number of college degrees. Crackpots with six graduate degrees and remarkable delusions on problems of practical government flunk the test just as often as the local village half-wit.

The bank of questions is, of course, prepared by men who may have quite violent prejudices on race, religion or sex—but they'll be facing a most horribly frustrating fact; the questions any individual testee gets are going to be selected by a random-number mechanism

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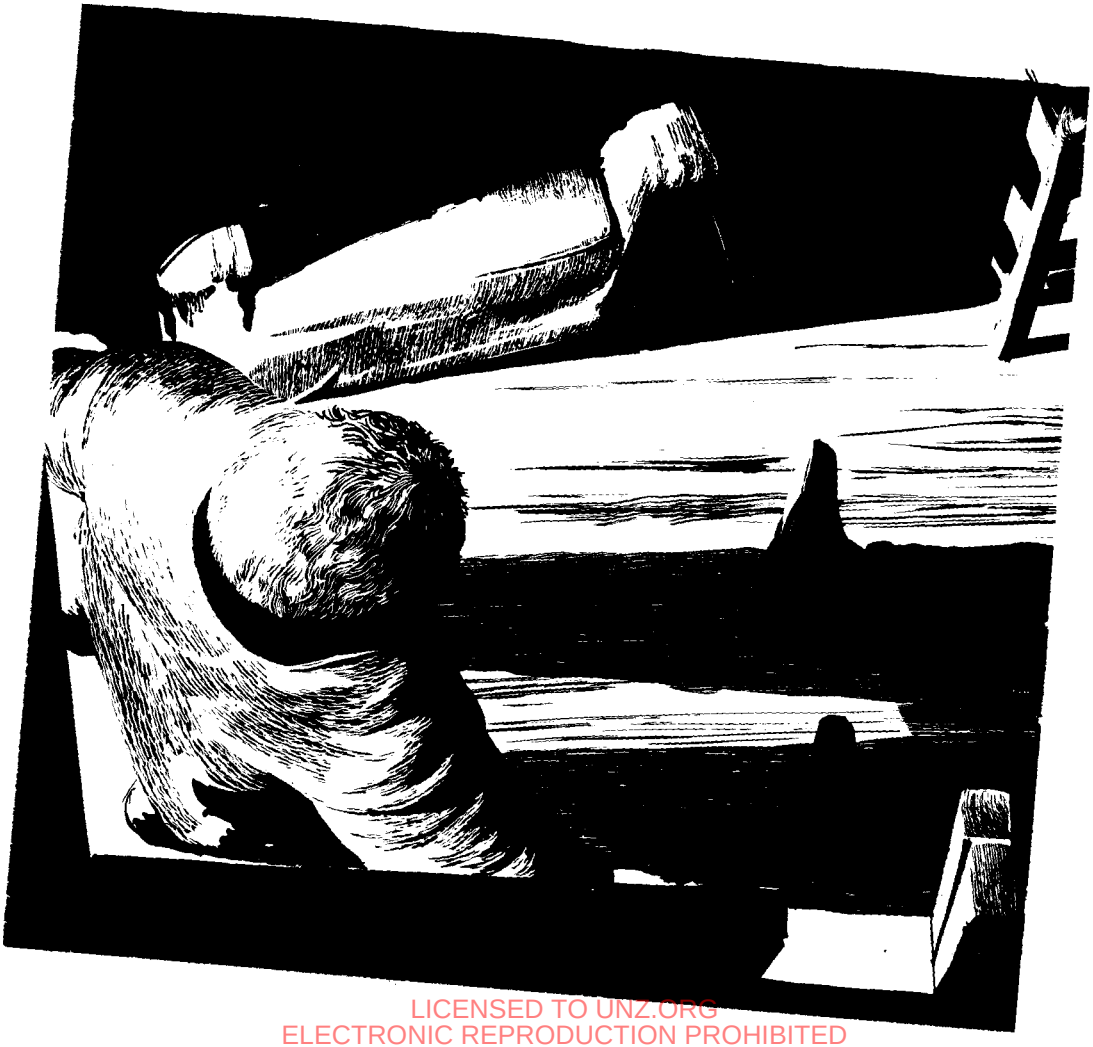

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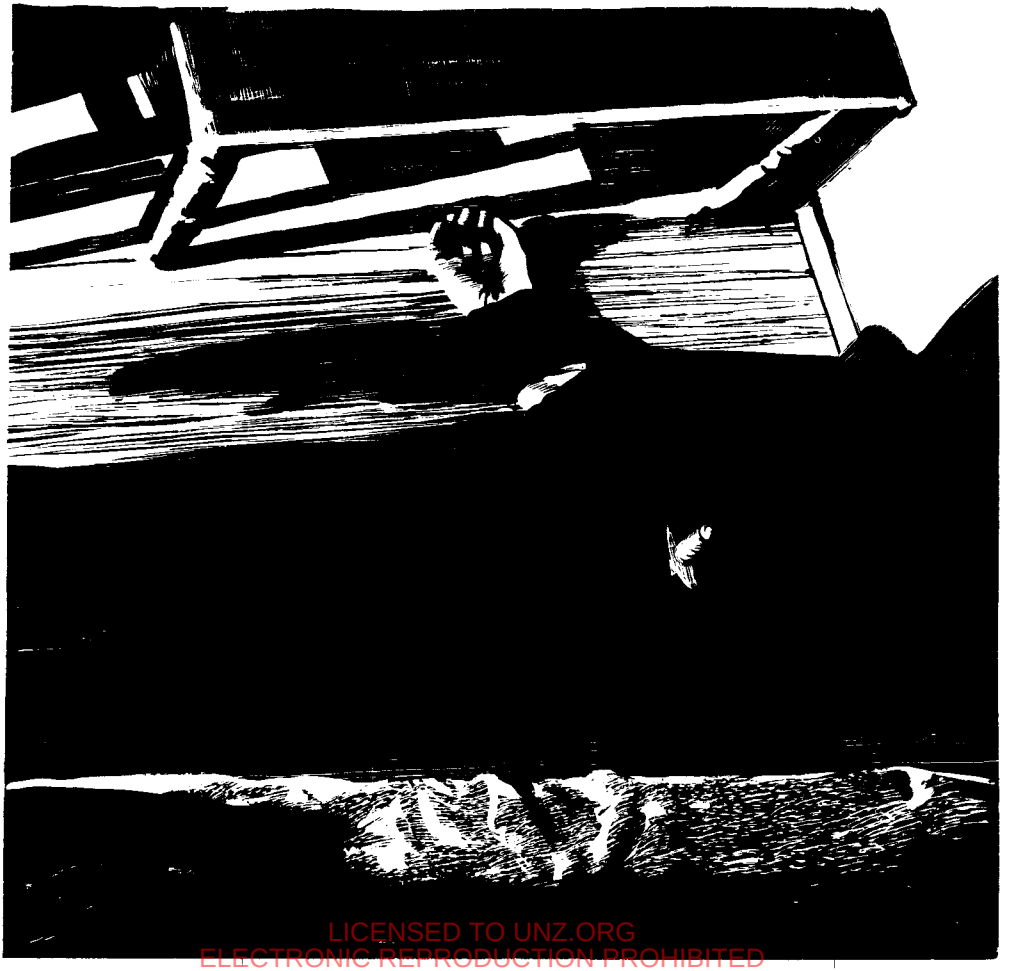
TOO MANY MAGICIANS

Part I of IV. Lord Darcy was an old hand at investigating crimes in a world where Magic, instead of Science had been developed. But when a Master Sorcerer is murdered in the hotel where a Magicians' Convention is being held . . .

RANDALL GARRETT

Illustrated by John Schoenherr



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I

Commander Lord Ashley, Special Agent for His Majesty's Imperial Naval Intelligence Corps, stood in the doorway of a cheap, rented room in a lower middle-class section of town near the Imperial Naval Docks in Cherbourg. The door was open, and a man lay on the floor with a large, heavy-handled knife in his chest.

His lordship lifted his eyes from the corpse and looked around the room. It was small; not more than eight by ten feet, he thought, and the low ceiling was only a bare six inches above his head. Along the right-hand wall was a low bed. It was made up, but the wrinkles in the cheap blue bedspread indicated that someone had been sitting on it—most likely, the dead man. A cheap, wooden table stood in the far left corner with a matching chair next to it. An ancient, lumpy-looking easy chair—probably bought secondhand—stood against the left wall, nearer the door. Another wooden chair, the twin of the one at the table, stood at the foot of the bed, completing the furniture. There were no pictures hung on the green-painted walls; there were no extraneous decorations of any kind. The personality of the man who lived here had not been implanted forcibly upon the room itself, certainly.

Lord Ashley looked back down at the body. Then, cautiously, he closed the door behind him, stepped over to the supine figure, and took a good look. He lifted up one hand and felt for the pulse that should throb at the wrist of a living man. There was none. Georges Barbour was dead.

His lordship took a step back from the corpse and looked at it thoughtfully. In his lordship's belt pocket were one hundred golden sovereigns, money which had been drawn from the Special Fund to pay Goodman Georges Barbour for his services to Naval Intelligence. But Goodman Georges, My Lord Commander thought to himself, would no longer be any drain upon the Special Fund.

My lord the Commander stepped over the body and looked at the papers on the wooden table at the far corner of the room. Nothing there of importance. Nothing that would connect the man with the Imperial Naval Intelligence Corps. Nonetheless, he gathered them all together and slipped them into his coat pocket. There was always the chance that they might contain information in the form of coded writing or secret inks.

The small closet in the right-hand corner of the room, near the door, held only a change of clothing, another cheap suit like the one the dead man wore. Nothing in the pockets, nothing in the lining. The two drawers in the closet revealed nothing but suits of underwear, stockings, and other miscellaneous personal property.

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Again he looked at the corpse. This search would have to be reported immediately to My Lord Admiral, of course, but there were certain things that it would be better for the local Armsmen not to find.

The room had revealed nothing. Since Barbour had moved into the room only the day before, it was highly unlikely that he could have constructed, in so short a time, some secret hiding place that would escape the penetrating search of my lord the Commander. He checked the room again and found nothing.

A search of the body was equally fruitless. Barbour had, then, already dispatched whatever information he had to Zed. Very well.

Lord Ashley looked around the room once more to make absolutely certain that he had missed nothing.

Then he went out of the room again and down the hall to the narrow, dim stairway that led to the floor below. He went down the stairway briskly, almost hurriedly.

The concierge, who sat in her office just to one side of the front door, was a rather withered but still bright-eyed little woman who looked up at the tall, aristocratic Commander with a smile that was as bright as her eyes.

"Ey, sir? What may I do for ye?"

"I have some rather sad news for you, Goodwife," my lord said quietly. "One of your tenants is dead. We shall have to fetch an Armsman at once."

"Dead? Who? Ye don't mean Goodman Georges, good sir?"

"None other," said his lordship. He had told the concierge only a few minutes before that he was going up to see Barbour. "Has he had any visitors in the past half hour or so?" The body, my lord the Commander reasoned to himself, was still warm, the blood still fluid. By no stretch of the imagination could Barbour have been dead more than half an hour.

"Visitors?" The old woman blinked, obviously trying to focus her thoughts. "Other than yourself, sir, I saw no visitors. But there! I mightn't have seen him at all. I was out for a few minutes, a few minutes only. I went to the shop of Goodman Fentner, the tobacconist, for a bit of snuff, as is the only form of tobacco I uses."

Commander Lord Ashley looked sharply at her. "Exactly when did you leave and when did you come back, Goodwife? It may be of the utmost importance that the time be known."

"Why . . . why . . . it was just afore you come, good sir," the old woman said rather nervously. "As I come in, I heard the bell of St. Denys strike the three-quarter hour."

Lord Ashley looked at his own watch. It was one minute after eleven. "The man must have waited until he saw you leave; then he came up and came down again before you returned. How long were you gone?"

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"Only as long as it takes to walk to the corner and back, sir. I don't like to stay too long away in the daytime when the door is open." She paused and a vaguely puzzled frown came over her face. "Who was it must have come up and gone down, sir?"

"Whoever it was," said my lord the Commander, "stabbed your tenant Georges Barbour through the heart. He was murdered, Goodwife, and that is why we must call an Armsman without delay."

The poor woman was absolutely shaken now, and Lord Ashley realized that she would be of no use whatever in dealing with the Armsmen. He was glad that he had asked her about any possible visitors before he had mentioned that the death was murder; otherwise, her valuable testimony might have flown from her head completely.

"Sit down, Goodwife," he said in a kindly voice. "Compose yourself. There is nothing to fear. I shall take care of summoning the Armsmen." As the old woman practically collapsed into the shabby overstuffed chair she kept in her office, Lord Ashley stepped to the outer door and opened it. He had heard the noise of boys' high-pitched voices outside, shrill with excitement over the game they were playing.

Because of his years of Naval training, it was easy for my lord the Commander to spot the urchin who was the obvious leader of the little group.

"Here, my lad!" he called out. "You, lad, with the green cap! How should you like to earn yourself a sixth-bit?"

The boy looked up, and his slight grimy face broke into a smile. "I would, my lord!" he said, snatching the rather faded green cap from his head. "Very much, my lord!" He had no notion whether the personage who had addressed him actually was a lord or not, but the personage in question was most certainly a gentleman, and such a person one always addressed as "my lord" whenever there was a job in the offing.

The other boys became suddenly silent, obviously hoping that they, too, might gain some small pecuniary advantage from this obviously affluent gentleman.

"Very well, then," said Lord Ashley briskly. "Here is a twelfth. If you return here with an Armsman inside of five minutes, I shall give you another like it."

"An . . . an *Armsman*, my lord?" It was obvious that he could not conceive of any possible reason why any sane person would want an Armsman within a thousand yards of him.

"Yes, an Armsman," Lord Ashley said with a smile. "Tell him that Lord Ashley, a King's Officer, desires his immediate assistance and then lead him back here. Do you understand?"

"Yes, My Lord Ashley! A King's Officer, my lord! Yes!"

"Very good, my lad. And you

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others. Here is a twelfth-bit apiece. If you come back with an Armsman within five minutes, you, too, will get another twelfth. And the first one to come back gets a sixth-bit for a bonus. Now run! Off with you!"

They scattered to the winds.

At half past two that afternoon, three men met in a comfortable, clublike room in the Admiralty Headquarters Building of His Imperial Majesty's Naval Base at Cherbourg.

Commander Lord Ashley sat tall, straight, and at ease, his slightly wavy brown hair brushed smooth, his uniform immaculate. He had changed into uniform only twenty minutes before, having been informed by the Lord Admiral that, while this was not exactly a formal meeting, civilian dress would not be as impressive as the royal blue and gold uniform of a full Commander.

Lord Ashley might not have been called handsome; his squarish face was perhaps a little too ruggedly weatherbeaten for that. But women admired him and men respected the feeling of determination that his features seemed to give. His eyes were gray-green with flecks of brown, and they had that seaman's look about them—as though Lord Ashley were always gazing at some distant horizon, inspecting it for signs of squalls.

Lord Admiral Edwy Brencourt had the same look in his blue eyes, but he was some twenty-five years older than Lord Ashley, although even at fifty-two his hair showed touches of gray only at the temples. His uniform, of the same royal blue as that of the Commanders, was somewhat more rumpled, because he had been wearing it since early morning, but this effect was partially offset by the gleaming grandness of the additional gold braid that encased his sleeves and shoulders.

In comparison with all this grandeur, the black-and-silver uniform of Chief Master-at-Arms Henri Vert, head of the Department of Armsmen of Cherbourg, seemed rather plain, although it was impressive enough on most occasions. Chief Henri was a heavy-set, tough-looking man in his early fifties who had the air and bearing of a stolid fighter.

Chief Henri was the first to speak. "My lords, there is more to this killing than meets the eye. At least, I should say, a great deal more than meets *my* eye."

He spoke Anglo-French with a punctilious precision which showed that it was not his natural way of speaking. He had practiced for many years to remove the accent of the local *patois*—an accent which betrayed his humble beginnings—but his effort to speak properly was still noticeable.

He looked at My Lord Admiral. "Who was this Georges Barbour, your lordship?"

My Lord Admiral picked up the

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brandy decanter from the low table around which the three of them sat and carefully filled three glasses before answering the Chief's question. Then he said: "You understand, Chief Henri, that this case is complicated by the fact that it involves Naval Security. Nothing that is said in this room must go beyond it."

"Of course not, my lord," Chief Henri said. He was well aware that this area of the Admiralty offices had been carefully protected by potent and expensive guarding spells. His Majesty's Armed Forces had a special budget for obtaining the services of the most powerful experts in that field, magicians who stood high in the Sorcerer's Guild. These were far more powerful than the ordinary commercial spells which guaranteed privacy in public hotels and private homes.

Such tactics were necessary because of the international situation. For the past half century, the Kings of Poland had been showing an ambitious streak. In 1914, King Sigismund III had begun a series of annexations that took bite after bite out of the Russian states, bringing under his sway all the territory between Minsk and Kiev. As long as Poland was moving eastward, the policy of the Anglo-French Empire had been to allow her to go her way. The Imperial domain was expanding rapidly in the New World, and Asia had seemed remote.

But Sigismund's son, King Casimir IX, was having trouble with his quasi-empire. He dared not push any farther east; the Russian states had formed a loose coalition in the early 'thirties, and the King of Poland had stopped his advances. If the Russians ever really united, they would be a formidable enemy.

Now Casimir IX was looking westward, toward the Germanic states that had for so long formed a buffer between Poland and the Anglo-French borders. The Germanies had kept their independence because of the tug-of-war diplomacy between Poland and the Empire. If the troops of Casimir IX tried to invade, say, Bavaria, Prince Reinhardt VI would call for Imperial aid and get it. On the other hand, if King John IV tried to collect a single sovereign in tax from Bavaria, and sent troops in to collect it, His Highness of Bavaria would scream just as loudly for Polish help.

So Casimir, his ambitious plans stalled for the moment, was doing his best to disrupt the Anglo-French Empire, to weaken it to the point of helplessness, before actually using armed invasion to take over the Germanies.

That would not be an easy job. The Empire had been a growing, functioning, dynamic force ever since the time of Henry II in the Twelfth Century. Henry's son, Richard the Lion Hearted, had neglected the Empire for the first ten years of his reign, but his narrow escape from death at the Siege of Chaluz had changed him. The long

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bout with infection and fever, caused by a wound from a crossbow bolt, had caused a personality change, and for the next twenty years Richard I had ruled wisely and well. His nephew, Arthur, had become king in 1219, three years after the death of the exiled Prince John, and had done an even better job of ruling than had Richard. He had gone down in history as "Good King Arthur," and was often confused in the popular mind with the earlier King Arthur of the Sixth Century.

Since then, the Plantagenet line had—by diplomacy when possible, by the sword when necessary—forged an Empire which had already lasted nearly twice as long as the Roman Empire and still showed no signs of deterioration.

Casimir IX couldn't use his armies, and his Navy was bottled up in the Baltic. No Polish fleet could get through the North Sea without running into trouble with either the Imperial Navy or the Navy of the Empire's Scandinavian allies. The North Sea and the Western Baltic were Imperial-Scandinavian property. Polish merchant ships were allowed to pass only after they had been boarded and searched for armament. King Casimir had tried to smash the blockade back in 1939 and had had his fleet blown out of the water for his troubles. He'd not likely try that again.

Instead, King Casimir had tried another kind of warfare—sabotage, insidious forms of terrorism, economic crises brought about by devious and underhanded methods, and a thousand other subtle forms of subversion. Thus far, he had wrought no real damage; his thrusts had been pinpricks only. But it was the vigilance of the Empire and of the King's Officers that had thwarted the Polish attempts to date.

Admiral Brencourt carefully replaced the glass stopple in the brandy decanter before he spoke again. "I'm afraid I must apologize to you, Chief Henri. Acting under my orders, Commander Lord Ashley has withheld information from the plainclothes Sergeant-at-Arms who questioned him about the Barbour murder this morning. That was, of course, for security reasons. But I have now authorized him to tell you the entire story. If you will, my lord . . ."

Lord Ashley tasted his brandy. Chief Henri waited respectfully for him to speak. He knew that certain things would still be omitted, that Lord Ashley had been briefed as to which details to reveal and which to conceal. Nevertheless, he knew that the story would be much richer in detail than it had been when he first heard it.

Lord Ashley lowered his glass and set it down. "Yesterday morning," he began, "Monday, October 24th, I received a special sealed packet from the Office of the Lord

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High Admiral in London. My orders were to deliver it to Admiral Brencourt this morning. I left London by train to Dover, thence across the Channel by special Naval courier boat to Cherbourg. By the time I arrived, it was nearly midnight." He paused and looked candidly at Chief Henri. "I should point out here that if my orders had been marked 'Most Urgent,' I should have immediately taken pains to deliver the packet to My Lord Admiral, no matter what the hour. As it was, my orders were to deliver it to him this morning. I give you my word that that packet never left my sight, nor was it opened, between the time I received it and the time it reached the Admiral's hands."

"I can verify that," said Admiral Brencourt. "As you are aware, Chief Henri, our Admiralty sorcerers cast spells upon the envelopes and seals of such packets—spells which, while they do not insure that the packets will not be opened by unauthorized persons, *do* insure that they cannot be opened without detection."

"I understand, my lord," said the Chief Master-at-Arms. "You had your sorcerer check the packet, then." It was a statement, not a question.

"Yes," said the Adimiral. "Continue, Commander."

"Thank you, my lord," said Lord Ashley. Then, addressing Chief Henri, "I spent the night at the Hotel Queen Jeanne. This morning at nine, I delivered the packet to My Lord Admiral." He glanced at the Admiral and waited.

"I opened the packet," Admiral Brencourt said immediately. "Most of what it contained is irrelevant to this case. There was, however, an enclosure which I was directed to hand over to Commander Lord Ashley. He was directed to take a certain sum of money to one Georges Barbour. That was the first that either of us had ever heard of Georges Barbour." He looked back at Lord Ashley, inviting him to take up the tale.

"According to my instructions within that sealed envelope," Ashley said, "I was to take the money immediately to Barbour, who was, it seems, a double agent, working ostensibly for His Slavonic Majesty Casimir of Poland, but in actuality working for the Naval Intelligence Service of the Imperial Navy. The money was to be delivered to Barbour between fifteen minutes of eleven and fifteen minutes after. I went to the appointed spot, spoke to the concierge, went upstairs, and found the door partially open. I rapped, and the door swung open farther. I saw Georges Barbour lying on the floor with a knife in his heart." He paused and spread his hands. "I was surprised by that development, naturally, but I had my duty to do. I removed his private papers—those on his desk—and I searched the room. The papers were turned over to the Admiral."

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"You must understand, Chief Henri," said Admiral Brencourt, "that there was a possibility that some of those papers might have borne coded or secret messages. None of them did, however, and the lot will be turned over to you. Lord Ashley will describe to you where each item lay in the room."

Chief Henri looked at the Commander. "Would you mind submitting a written report, with a sketch map indicating where the papers and so on were?" He was more than a little piqued at the Navy's high-handed treatment of evidence in a murder case, but he knew there was nothing he could do about it.

"I will be happy to prepare such a report," said Lord Ashley.

"Thank you, your lordship. A question: Were the papers disarrayed in any way—scattered?"

The Commander frowned slightly in thought. "Not *scattered*, no. That is to say, they did not appear to have been thrown around haphazardly. But they were not all in one pile. I should say that they were . . . er . . . neatly disarrayed, if you follow my meaning. As though Barbour had been going through them."

"Or someone *else* had gone through them," said the Chief thoughtfully.

"Yes. That's possible, of course," the Commander agreed. "But would the killer have had time to look through Barbour's papers?"

"Suppose," the Chief said slowly, "that there was one single paper—or maybe a single set of them—that the killer was after. And suppose he knew enough to be able to recognize those papers on sight. He wouldn't have needed more than a few seconds to find them, would he?"

The Commander and the Admiral glanced at each other.

"No," said the Commander after a moment. "No, he wouldn't."

"Do you have any idea what such paper or papers might pertain to?" Chief Henri asked with deceptive casualness.

"None," said My Lord Admiral firmly. "And I give you my word that I am concealing nothing. This office was not even aware of the very existence of Georges Barbour; we have no idea what he was doing or what sort of papers he may have been handling. This was our first knowledge of him, and we have received no further word from London. Thus far, London does not, of course, even know he is dead. One day, perhaps, some sorcerer may discover a way to get teleson lines across the Channel, but until then we must rely on dispatches sent by courier."

"I see." Chief Henri rubbed his hands together rather nervously. "I trust that your lordships understand that I am bound to do my duty. A murder has been committed. It must be solved. I am bound to expend every effort to discover the

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identity of the killer and bring him to justice. There are certain steps which I must, by law, take."

"We quite realize that, Chief Henri," said the Lord Admiral.

The Chief finished the rest of his brandy. "At the same time, we have no desire to hamper the Navy in any way nor to disclose information publicly that may be of benefit to our country's enemies."

"Naturally," the Lord Admiral agreed.

"But this case is a difficult one," Chief Henri went on. "We know—thanks to the evidence of the concierge—the time at which the crime was committed to within ten minutes. We know that Barbour stayed in that room all night, left this morning at about five minutes of ten, and came back at approximately twenty after. Everyone else in the house had left much earlier, since they are all working folk. There was no one in the building except Barbour and the concierge. All very fine so far as it goes.

"But this case is almost clueless. We do not know Barbour. We have no notion of whom he might have known, whom he might have met, or with whom he might have had dealings. We have no idea who might have owned the very common knife with which he was killed.

"When all that is added to the international ramifications of this affair, I am forced to admit that the case is beyond me. The law is clear upon that point; I must notify the Investigation Department of His Royal Highness at Rouen."

Admiral Brencourt nodded. "That's quite clear. Certainly, anyone from His Highness' offices would be of assistance. Is there any further way in which we can help you?"

"If it is possible, My Lord Admiral, there is. Presumably someone in London knows something about this fellow Barbour. If it would not be a violation of security, I should like to know as much about him as possible. I should like very much to have more information from London."

"I shall certainly see what can be done, Chief Henri," the Lord Admiral said. "Lord Ashley is returning to England within the hour. The Office of the Lord High Admiral must be informed of this development immediately, of course. I shall send a letter requesting the information you desire."

In spite of himself, Chief Henri grinned. "By the Blue! Lord Darcy is never wrong!"

"Darcy?" My Lord Admiral blinked. "I don't . . . Oh, yes. I recall now. Chief Investigator for His Highness. He cleared up that situation here in Cherbourg last year—the 'Atlantic Curse' business—didn't he?"

Chief Henri coughed delicately. "I may say that he did, My Lord Admiral. I am not permitted to discuss details."

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"Of course, of course. But why do you say that he is never wrong?"

"Well, I have never known him to be," Chief Henri said staunchly. "When I made my call to Rouen to inform his lordship of the murder, he told me that he would not be able to come immediately, that he was sending down his second-in-command, Sir Eliot Meredith, to take charge until he could get here. He also said that you would undoubtedly be sending a courier to London almost immediately and he wondered if I would be so good, as he put it, to ask My Lord Admiral if the courier could carry a special message for him."

Lord Admiral Brencourt chuckled. "An astute gentleman, Lord Darcy. I dare say we can see our way clear to that. What is the nature of the message?"

"Lord Darcy's chief forensic sorcerer, Master Sean O Lochlainn, is attending a convention in London at the Royal Steward Arms. He would like you to convey the message that he is to return to Normandy, to come straight here to Cherbourg, as soon as possible."

"Certainly," the Lord Admiral said agreeably. "If you will write the letter, Lord Ashley will deliver it upon his arrival. The Royal Steward is not far from the Admiralty offices."

"Thank you," said Chief Henri. "The mail packet will not leave Cherbourg until this evening, and the letter wouldn't be delivered until late tomorrow afternoon. This will save a great deal of time. May I borrow pen and paper?"

"Certainly; here you are."

Chief Henri dipped the Admiral's pen in the inkstand and began to write.

II

Sean O Lochlainn, Master Sorcerer, Fellow of the Royal Thaumaturgical Society, and Chief Forensic Sorcerer to His Royal Highness, Richard, Duke of Normandy, was excruciatingly angry and doing his best not to show it. That his attempt to do so was highly successful was due almost entirely to his years of training as an officer of the law; had his Irish blood been allowed to follow its natural bent, it would have boiled over. But above all things, a sorcerer must have control over his own emotions.

He was not angry at any person, least of all himself. He was furious with Fate, with Chance, with Coincidence—poor targets upon which to vent one's wrath even if one were to allow oneself to do so. Therefore, Master Sean channeled his ire, converted it, and allowed it to show as a pleasant smile and a pleasant manner.

But that did not keep him from thinking more about the paper he had spent six months in preparing, only to find that he had been anticipated, than in listening to what his lordship the Bishop of Winchester

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was saying. His eyes wandered over the crowd in the Main Exhibit Hall while the voice of the Bishop—who was a fine thaumaturgist and Healer, but a crashing bore—droned on in his right ear, keeping just enough attention on the episcopal voice to enable him to murmur "Yes, my lord," or "Indeed, my lord," at appropriate intervals.

Most of the men and women in the hall were wearing the light-blue dress clothing appropriate to sorcerers and sorceresses, but there were many spots of clerical black, and several of episcopal purple. Over in one corner, four bearded Healers in rabbinical dress were conversing earnestly with the Archbishop of York, whose wispy white hair seemed to form a cloud around his purple skullcap. Over near the door, looking rather lost, was a Naval Commander in full dress uniform, complete with gold braid and a thin, narrow-bladed dress sword with a gilded hilt. Master Sean wondered briefly why a Naval officer was here. To give a paper, or as a guest?

His attention shifted to the botanical section of the exhibit. He thought he recognized the back of the man who was standing in front of a row of potted herbs.

"I wonder what *he's* doing here?" he muttered without thinking.

"Um-m-m?" said the Bishop of Winchester. "Who?"

"Oh. I beg your pardon. I thought I recognized a colleague of my master, Lord Darcy, but I couldn't be sure, since his back is turned."

"Where?" asked my lord the Bishop, turning his head.

"Over at the botanical display. Isn't that Lord Bontriomphe, Chief Investigator for London? It looks like him from here."

"Yes, I believe it is. The Marquis of London, as you may know, makes a hobby of cultivating rare and exotic herbs. Very likely he sent Bontriomphe down here to look over the displays. My lord The Marquis leaves his palace but seldom, you know. Dear me! Look at the time! Why, it's after nine! I had no idea it was so late! I must deliver an address at ten this morning, and I promised Father Quinn, my Healer, that I'd have a short session with him before that. You must excuse me, Master Sean."

"Of course, my lord. It has been most pleasant." Master Sean took the outstretched hand, bowed, and kissed the ring.

"Indeed, I found it most enlightening, Master Sean. Good day."

"Good day, my lord."

Physician, heal thyself, Master Sean thought wryly. The phrase was archaic only in that Healers no longer relied on "physick" to heal their patients. When the brilliant genius, St. Hilary Robert, worked out the laws of magic in the Fourteenth Century, the "leech" and the "physician" might have heard their

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death knell ringing from the bell tower of the little English monastery at Walsingham, where St. Hilary lived. Not everyone could use the laws; only those who had the Talent. But the ceremony of healing by the Laying On of Hands had, from that time on, become as reliable as it had been erratic before. However, it was still easier to see—and to remove—the speck in one's brother's eye than to see the beam in one's own. Besides, my lord of Winchester was a very old man, and the two ailments still incurable by the finest Healers were old age and death.

Master Sean looked back at the botanical display, but Lord Bontriomphe had vanished while the Bishop was taking his leave, and, look as he might, the tubby little Irish sorcerer could not locate the Chief Investigator of London anywhere in the crowd.

The Triennial Convention of Healers and Sorcerers was an event which Master Sean always looked forward to with pleasure, but this time the pleasure had soured—badly. To find that a paper, which one had been researching for three years and writing on for six months, has been almost exactly paralleled by the work of another is not conducive to overwhelming joy. Still, there was no help for it, Sean thought, and, besides, Sir James Zwinge felt as upset about it as Sean O Lochlainn did.

"Ah! Good morning, Master Sean! You slept well last night, I trust?" The brisk, rather dry voice came from Master Sean's left.

He turned quickly and gave a medium bow. "Good morning, Grand

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Master," he said pleasantly. "I slept reasonably well, thank you. And you?"

Master Sean had *not* slept well, and the Grand Master not only knew he hadn't but knew *why* he hadn't. But not even Master Sean O Lochlainn would argue with Sir Lyon Gandolphus Grey, K.G.L., M.S., Th.D., F.R.T.S., Grand Master of the Most Ancient and Honorable Guild of Socerers.

"As well as yourself," said Sir Lyon. "But at my age, one must not expect to sleep well. I should like to introduce you to a promising young man."

The Grand Master was an imposing figure, tall, thin almost to the point of emaciation, yet with an aura of strength about him, both physical and psychical. His hair was silvery gray, as was the rather long beard which he affected. His eyes were deep-set and piercing, his nose thin and aquiline, his brows bushy and overshadowing.

But Master Sean had known the Grand Master so long that his face and figure were too familiar to be remarkable. The tubby little Irish sorcerer found his eyes drawn to the young man who stood next to Sir Lyon.

The man was of average height, taller than Master Sean but not nearly as tall as Sir Lyon Grey. The sleeves of his blue dress suit were slashed with white, denoting a Journeyman Sorcerer, instead of the silver of a Master. It was his face which drew Master Sean's attention. The skin was a dark reddish-brown, the nose broad and well shaped, the nearly black pupils of his eyes almost hidden beneath heavy lids. His mouth was pleasantly smiling and rather wide.

"Master Sean," said Sir Lyon, "may I present Journeyman Lord John Quetzal, fourth son of His Gracious Highness, the Duke of Mechicoe."

"A pleasure to meet your lordship," Master Sean said with a slight bow.

Lord John Quetzal's bow was much deeper, as befitted Journeyman to Master. "I have looked forward to this meeting, Master," he said in almost flawless Anglo-French. Master Sean could detect only the slightest trace of the accent of Mechicoe, one of the southernmost duchies of New England, not far north of the isthmus which connected the continent of New France. But then, one would not expect a regional accent from a scion of the Moqtessuma family.

"Lord John Quetzal," said Sir Lyon, "has determined to take up the study of forensic sorcery, and I feel he will do admirably in that field. And now, if you will excuse me, I must see the Program Committee and check up on the agenda."

And Master Sean found himself left with Journeyman Lord John Quetzal. He gave the young man his best Irish smile. "Well, your

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lordship, I see that you're not only quite intelligent but that you have a powerful Talent."

The young Mechicain's face took on an expression of startled awe.

"You can tell that just by looking?" he asked in a hushed voice.

Master Sean's smile broadened. "No, I deduced it." *Lord Darcy should hear me now,* he thought.

"Deduced it? How?"

"Why, bless you," Master Sean said with a chuckle, "the introduction you got from Grand Master Sir Lyon was enough to tell me that. 'A promising young man,' he calls you. 'I feel he will do admirably,' he says. Why, Sir Lyon Grey wouldn't introduce the King himself that way, the King having no Talent to speak of. If you have impressed the Grand Master, you come highly recommended indeed. Further, I can deduce that you're not the kind of lad who'd let praise go to his head—else the Grand Master wouldn't have said such a thing in your hearing."

Master Sean could sense that there was an embarrassed blush rising up beneath the young man's smooth mahogany skin, and quickly changed the subject. "What's been your specialty so far?"

Lord John Quetzal swallowed. "Why . . . uh . . . black magic."

Master Sean stared, shocked. He could not have been more shocked if a Healer or chirurgeon had announced that he specialized in poisoning people.

The young Mechicain aristocrat looked even more flustered for a second or two, but he regained control quickly. "I don't mean I *practice* it! Good Heavens!" He looked round as if he were afraid someone might have overheard. Satisfied that no one had, he returned his attention to Master Sean. "I don't mean I *practice* it," he repeated in a lower voice. "I've been studying it with a view to its prevention, you see. I know you haven't much of it here in Europe, but . . . well, Mechicoe isn't the same. Even after four hundred years, there are still believers in the Old Religion—especially the worship of Huitsilopochtelie, the old War God. Not in the cities, or even in most of the rural farming areas, but in the remote places of the mountains and the jungles."

"Ah, I see. What sort of a god was this Eight-whatsisname?" asked Master Sean.

"Huitsilopochtelie. The sort of god that's quite common among barbaric peoples, especially militaristic ones. Rigid discipline, extreme asceticism, voluntary privation, and sacrifice were expected of his followers. A typical Satanic exaggeration of the virtues of chastity, poverty, and obedience. Sacrifice meant cutting the hearts out of living human beings. Huitsilopochtelie was a nasty, bloody devil."

"Human sacrifice—or, at least, the advocation of it—is not unknown here," Master Sean pointed out.

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Lord John Quetzal nodded. "I know to what you refer. The so-called Ancient Society of Holy Albion. Their ringleaders were cleaned up in May of 1965, as I recall—or early June."

"Aye," said Master Sean, "and that hasn't got rid of all of 'em by any means. Black magic isn't as uncommon as you might think, either. The story wasn't released to the public, but as a Journeyman o' the Guild, you may have read about the case of Laird Duncan of Duncan, back in '63."

"Oh, yes. I read your write-up of it in the *Journal*. That was in connection with the mysterious death of the late Count D'Evreux. I should have liked to have been there when Lord Darcy solved that one!" There was a light in his obsidian eyes.

"What has your interest in forensic sorcery got to do with black magic?" asked the Irish sorcerer.

"Well, as I said, there is a lot of Huitsilopochtelie worship in the remoter parts of the Duchy—in fact, it gets worse farther south; my noble cousin, the Duke of Eucatanne, is constantly troubled by it. If it were just peasant superstition, it wouldn't be so bad, but some of those people have genuine Talent, and some of the better educated among them have found ways of applying the Laws of Magic to the rites and ceremonies of Huitsilopochtelie. And always for evil purposes. It's black magic of the worst kind, and I intend to do what I can to stamp it out. They don't confine their activities to the remote places where their temples are hidden; their agents come into the villages and terrorize the peasants and into the cities to try to disrupt the Government itself. That sort of thing must be stopped, and I will see that it *is* stopped!"

"A formidable ambition—and a laudable one. Do you—"

"Ah! Master Sean!" said an oily voice from just to the left and behind Lord John Quetzal.

Master Sean had noticed the approach of Master Ewen MacAlister, hoping—in vain, as it turned out—that Master Ewen would not notice him. He had enough troubles as it was.

"Master Ewen," said Master Sean with a forced smile. Before he could introduce Lord John Quetzal, Master Ewen, who totally ignored the journeyman sorcerer, began talking.

"Heard you had a bit of a set-to with Sir James yesterday, Sean, eh? Heheh."

"Hardly a set-to. We—"

"Oh, I didn't mean a quarrel. What *were* you arguing about, though? Nobody seems to know."

"Because it is nobody's business," snapped Master Sean.

"Of course not, heheh. Of course not. Still, it must have been something hot, or the Grand Master wouldn't have broken it up."

"He didn't 'break it up', as you put it," Master Sean said through

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set teeth that were wreathed in a false smile. "He merely arbitrated our discussion."

"Yes. Heheh. Naturally." The lanky, sandy-haired Scot smiled toothily. "But I don't blame you for being angry at Sir James. He can be pretty stiff at times. Heheh. Cutting, I mean. Sharp-tongued, he is."

"Quite sharp-tongued," said Lord John Quetzal in agreement. "I've felt the bite of it, myself."

Master Ewen MacAlister turned and looked at the young Mechicain as if seeing him for the first time. "It is not proper," he said chillingly, "for a Journeyman to interrupt the conversation of Masters, nor for a Journeyman to criticize a Master. And one would be wise in any case not to criticize the Chief Forensic Sorcerer for the City of London."

Lord John Quetzal's face became wooden, masklike. He gave a courteous bow. "I beg your pardon, Master. I have erred. If you will excuse me, Masters, I have an appointment. I trust I may see you again, Master Sean."

"Certainly. How about lunch? I have some things I'd like to talk over with you."

"Excellent. When?"

"Noon, sharp. In the dining room."

"I shall be there. Good day, Master Sean, Master Ewen." He turned and walked away, proudly, even a little stiffly.

"Good day, your lordship," Master Sean said to his retreating back.

Master Ewen blinked. " 'Your lordship,' you said? Who is the boy?"

"Lord John Quetzal," said Máster Sean with a malicious smile, "is the son of His Gracious Highness, Netsualcoyotle, Duke of Mechicoe."

Master Ewen paled visibly. "Dear me," he said in a low voice. "I do hope he wasn't offended."

"Your ingratiating ways will eventually make you many friends in high places, *Master* Ewen. And now, if you'll excuse me, I, too, have an appointment." He walked away, leaving MacAlister staring after the Mechicain lad and worrying his lower lip with his long horsey upper teeth.

Master Ewen's snobbery, Sean thought, would keep him from ever getting anywhere, no matter how good a magician he was. A Master had a perfect right to tick off a Journeyman, but for important things, not trivial ones. On the other hand, if one does exercise that right, one shouldn't go all puddingy just because the one ticked off happens to have high-ranking relatives. Master Sean decided he needed something to take the bad taste out of his mouth.

He looked at his wrist watch. Nine twenty-two. He still had time for a cool, foamy beer before his appointment. He headed for the private saloon bar that had been reserved for the Convention members and their guests. Five minutes la-

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ter, with a pint of good English beer firmly ensconced in his round Irish belly, Sean was climbing the stairs to the upper floor. Then he walked down the hall toward the room that had been assigned to Master Sir James Zwinge, Chief Forensic Sorcerer for the City of London.

At precisely half past nine, Sean rapped on the door. There was no answer, but he fancied he could hear someone moving about inside so he rapped again, more loudly.

This time, he got an answer, but certainly not the one he had been expecting.

The scream was hoarse and reverberating, and yet the words were clear enough. "Sean! Help!"

And then came another sound which Sean recognized as that of someone—or something—heavy falling to the floor of the room.

Sean grabbed the door handle and twisted. To no avail; the door was locked firmly.

Other doors, up and down the corridor, were popping open.

III

At precisely 7:03 that evening, Lord Darcy, Chief Investigator for His Royal Highness, Richard of Normandy, stepped out of a cab at the front door of the immense town house of my lord the Marquis of London. In Lord Darcy's hand was a large suitcase and in his eye was a purposeful gleam.

The soldier at the door, wearing the bright yellow uniform of the Marquis' Own Guard, asked him his business, and Lord Darcy informed the guard in a quiet, controlled voice that My Lord Marquis was expecting Lord Darcy from Rouen.

The guardsman looked at the tall, rather handsome man with the lean face and straight brown hair and wondered. In spite of the name and the city he gave as his residence, the gentleman spoke Anglo-French with a definite English accent. Then the guardsman saw the cold light that gleamed in the eyes and decided that it would be better to check with Lord Bontriomphe before he asked any questions.

Lord Bontriomphe was at the door in less than a minute, ushering Lord Darcy in.

"Darcy! We weren't expecting you," he said with an affable smile.

"No?" Lord Darcy asked with a smile that had the hardness of chilled steel about it. "Am I to presume that you expected me to receive My Lord Marquis' message and then take off on a pilgrimage to Rome?"

Lord Bontriomphe noted the controlled anger. "We expected you to call us on the teleson from Dover," he said. "We would have had a carriage meet you at the station when the train pulled in."

"My Lord Marquis," said Lord Darcy coolly, "has not indicated that he was willing to pay for any expenses; therefore I assumed that such expenses would come out of

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my own pocket. Weighing the cost of a teleson message against the cost of a cab made me prefer the latter."

"Um-m-m. I see. Well, come on into the office. I think we'll find My Lord Marquis waiting for us." He led Lord Darcy down the corridor, opened a door and stood aside to allow Lord Darcy to pass.

The office was not immense, but it was roomy and well appointed. There were some comfortable-looking chairs and a large one covered with expensive red Moorish leather. There was a large globe of the world on a carved stand, two or three paintings—including a reproduction of a magnificent Vandenbosch which depicted a waterfall—and a pair of large desks.

Behind one of them sat my lord the Marquis de London.

The Marquis could only be described as immense. He was absolutely corpulent, but his massive face had a remarkable sharpness of expression, and his eyes had a thoughtful, introspective look. And in spite of a weight that was better than twenty stone, there was an air of firmness about him that gave him an almost regal air.

"Good evening, my lord," he said without rising, but extending a broad, fat hand that reminded one of the flipper of a seal.

"My Lord Marquis," said Lord Darcy, gripping the hand and releasing it.

Then, before the Marquis could say anything more, Lord Darcy put one hand firmly on the desk, palm down, leaned over to look down at de London, and said: "And now, how much of this is flummery?"

"You mock me," said the Marquis heavily. "Sit down, if you please; I don't like to have to crane my neck to look up at you."

Lord Darcy took the red leather chair without taking his eyes off the Marquis.

"None of it is flummery," the Marquis said. "I admit I do not have the full roster of facts, but I feel I have enough to justify my actions. Would you care to hear Lord Bontriomphe's report?"

"I would," Lord Darcy said. He turned and looked at the second desk, behind which Lord Bontriomphe had seated himself. He was a fairly tall, rather good-looking, square-jawed man who was always well dressed and carried about him an air of competence.

"You may report, Bontriomphe," said the Marquis.

"Everything?"

"Everything. The conversation verbatim."

Lord Bontriomphe leaned back and closed his eyes for a moment. Lord Darcy prepared himself to listen closely. Bontriomphe had two things which made him of tremendous value to the Marquis of London: a flair for narrative and an eidetic memory.

Bontriomphe opened his eyes and looked at Darcy.

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"At my lord's orders," he said, "I went to the Sorcerers and Healers Convention to look at the herb displays. He was especially interested in the specimens of Polish devilwort, which he—"

The Marquis snorted. "Pah! That has nothing to do with the murder."

"I haven't said it did. Where was I? Oh, yes. Which he hasn't been able to grow from the seed, only from cuttings. He wanted to find out how the seed-grown plants had been cultivated.

"I went in to the Royal Steward a little after nine. The place was packed with sorcerers of every size and description and enough clergy to fill a church from altar to narthex. I had to convince a couple of guards at the door that I wasn't just some tourist who wanted to gawk at the celebrities, but I made it to the herb displays at about ten after. I took a good long look at the Polish Devilwort—it seemed to be thriving well—and then took a survey of the rest of the stuff. I took some notes on a few other rarities, but that wouldn't interest you, so I'll omit the details.

"Then I wandered around and looked at the rest of the displays, just to see if there was anything interesting. I didn't meet anyone I knew, which made me just as happy, since I hadn't gone there for chitchat. That is, I didn't meet any acquaintance until nine twenty. That was when Commander Lord Ashley tapped me on the shoulder.

"I turned around, and there he was, in full dress Naval uniform, looking as uncomfortable as a Navy officer at a magicians' convention.

" 'Bontriomphe,' he said, 'how good to see you again.'

" 'Good to see you,' I said, 'and how is the Imperial Navy? Have you become a Specialist in Sorcery?'

"That was a deliberate joke. Tony does have a touch of the Talent; he has what they call 'an intermittent and diffuse precognitive ability' that has helped him out of tight spots several times, and which, incidentally, is useful to him at the gaming tables. But in general he doesn't know any more about magic than an ostrich knows about icebergs.

"He laughed a little. 'Not yet and not ever,' he said. 'I'm here on Naval business. I'm looking for a friend of yours, but I don't know what he looks like.'

" 'Who are you looking for?' I asked.

" 'Master Sean O Lochlainn. I checked at the desk and got his room number, but he isn't in.'

" 'If he's around,' I said, 'I haven't seen him. But then I haven't been looking for him.'

"I stood there and looked around, but I couldn't spot him any place in that crowd. But I did happen to spot another face I knew.

" 'If anybody knows where Master Sean is,' I said, 'it will be Grand

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Master Sir Lyon Grey. Come along.'

"Sir Lyon was standing over near one of the doors talking to a man who was wearing the habit of one of the Flemish orders. The monk took his leave just as Lord Ashley and I approached Sir Lyon.

" 'Good morning, Sir Lyon,' I said. 'I think you've met Commander Ashley.'

" 'Good morning, Lord Bontriomphe,' the old sorcerer said. 'Yes, Commander Ashley and I have met. In what way may I be of assistance?'

" 'I have a message for Master Sean O Lochlainn, Sir Lyon,' said Ashley. 'Have you any idea where he is?'

"The Grand Master started to answer, but whatever he was going to say was lost. A scrawny little Master Sorcerer with a nose like a spike and rather bugged-out blue eyes suddenly popped from the door nearby, his hands fluttering about like a couple of drunken moths who had mistaken his head for a candle flame. He took a fast look around, saw Sir Lyon, and made a beeline for us, still flapping his hands.

" 'Grand Master! Grand Master! I must speak to you immediately!' he said in a low, excited voice.

" 'Compose yourself, Master Netly,' the Grand Master said. 'What is it?'

"Master Netly noticed Lord Ashley and me and said: 'It's . . . uh . . . confidential, Grand Master.'

"The Grand Master bent a little and cocked his head to one side while Master Netly, who is a good foot shorter than Sir Lyon, stood on tiptoe to whisper in his ear. I couldn't catch a word of what he said, but I saw Sir Lyon's eyes open wider as the skinny little sorcerer spoke. Then his eyes shifted and he looked straight at me.

"When he straightened up, he was still looking at me. And believe me when Grand Master Sir Lyon Gandolphus Grey fixes you with those eyes of his, you have an urge to search your conscience to see what particularly odious sins you have committed lately. Fortunately, my soul was reasonably pure.

" 'Will both of you gentlemen come with me, please?' he asked, shifting his gaze to Lord Ashley. 'Something of importance has come up. If you will be so good as to follow me . . .'

"He turned and went out the door, and Ashley and I followed. As soon as we got out of the exhibition hall and into the corridor, I asked: 'What seems to be the trouble, Sir Lyon?'

" 'I am not certain yet. But apparently something has happened to Master Sir James Zwinge. We are fortunate that you, as an officer of the King's Justice, are on hand.'

"Then Lord Ashley said: 'Your pardon, Sir Lyon, but the delivery of this message to Master Sean is most important.'

" 'I am aware of that,' the old

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boy said rather testily. 'Master Sean is already at the scene. That is why I asked you to come along.'

" 'I see. I beg your pardon, Sir Lyon.'

"We followed him up the stairs and down the upper corridor without saying anything more. Netly pattered along with us, his hands still flitting about.

"There were three men and a woman standing in the hall outside the room that the management had assigned to Zwinge. Two of the men were wearing the light-blue dress clothing of sorcerers, and so was the woman. The third man was wearing ordinary merchant-class business clothes.

"One of the sorcerers was Master Sean. The second was a tall young man wearing the white slashes of a Journeyman, a Mechicain, by the look of him. The sorceress was one of the most beautiful honey blondes I have ever had the good fortune to meet in a hotel corridor, with a full-breasted, wide-shouldered, wide-hipped, narrow-waisted body and dark-blue eyes. She was only a couple of inches shorter than I am, and she—"

"Pfui-" For the second time, the Marquis of London interrupted the report of Lord Bontriomphe. "While you may enjoy dwelling upon the beauties of women, there is no need to do it, much less to overdo it. Darcy has already met Mary, Dowager Duchess of Cumberland. Continue."

"Sorry," Lord Bontriomphe said blandly. "The third man turned out to be Goodman Lewis Bolmer, the manager of the Royal Steward Arms. He's about an inch taller than Master Sean and looks as though he had lost about fifty pounds too fast. His face and jowls sag and give him a sort of floppy look, as if he were made up of hounds' ears. He looked both worried and frightened.

"I asked what had happened as soon as I had identified myself.

"Master Sean said: 'I had an appointment with Sir James at nine thirty, I knocked on the door and no one answered. I knocked again. Then I heard a scream and a sound as of a heavy body falling. Since then, there's been nothing. The door is locked, and we can't get in.'

"I looked at Goodman Lewis. 'Have you the key?'

" 'Yes, your lordship,' he said, nodding and jiggling his jowls. 'I brought it as soon as Master Netly told me what had happened. But it won't turn the bolt. It's stuck. Spell on it, I daresay.'

" 'It's a personalized lock spell,' Master Sean said. 'I'd say that only Sir James' key will open it. But I'm afraid he may be badly injured. We'll have to get that door down.'

"If you've ever been in the Royal Steward, you know how thick those doors are. Very old fashioned oak work—the building dates back to the Seventeenth Century.

" 'Can you take the spell off, Sean?' I asked.

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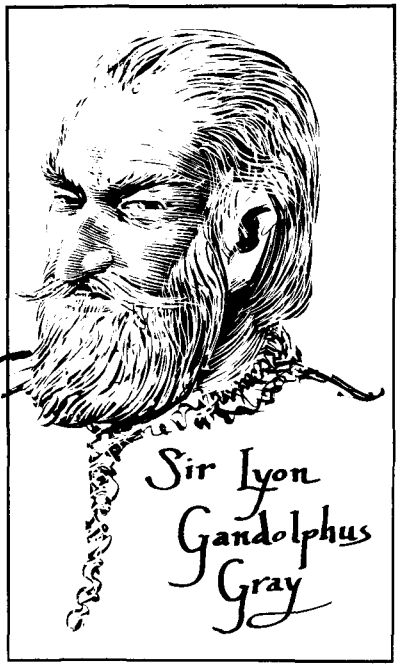

" 'Sure I can,' he said. 'But it would take time. Half an hour if I'm lucky and get the psychic pattern right away. Two or three hours if I'm not lucky. That's not just an ordinary commercial spell; that's a personal job put on there by Master Sir James himself.'

"I knelt down and took a peek through the keyhole. I couldn't see anything but the far wall of the room. The keyhole is big enough, but the door is so thick that it's like looking through a tunnel. Those doors are two inches thick.

"I stood up again and turned to Goodman Lewis. 'Go get an ax. We'll have to chop through.'

"He looked as if he were about to object, but he just said, 'Yes, your lordship. Right away,' and hurried away.

"While he was gone, I asked some questions. 'What happened right after you heard the scream, Sean?'

" 'Nothing for a few seconds,' he said. 'Then my colleagues, here, came out of their rooms.'

" 'Which rooms?'

" 'Netly Dale has the room to the left of Sir James' room, and Lord John Quetzal has the room to the right, if I am not mistaken.'

"Netly clasped his hands together to keep from fluttering them and nodded. 'That's right. Absolutely correct.'

"Lord John Quetzal just nodded his head in agreement.

" 'Lord John Quetzal,' I said. The name had struck a bell. 'You are the fourth son of His Gracious Highness, De Mechicoe, I think?'

"He bowed. 'The same, my lord.'

"Then I turned to the blond vision. I didn't know who she was at the time, but she was wearing the De Cumberland arms in full on her right breast instead of just the crest on her shoulder, so I deduced—"

Lord Bontriomphe stopped his narrative again as he heard a snort from De London. "Yes, my Lord?"

"It is not necessary to inform us of your deductions of the obvious," said the Marquis with heavy sarcasm. "Darcy wants facts, not the rather puerile thought processes by

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which you may have arrived at them."

"I sit corrected, my lord," said Lord Bontriomphe. "At any rate, I correctly identified the lady."

" 'Where is your room, Your Grace?' I asked.

" 'Just across the hall,' she said, pointing.

"The hallways in the Royal Steward are eight feet wide, and her room was directly opposite Zwinge's.

" 'Thank you,' I said. 'Now . . .' I looked at the others. . . . why did you all come out of your rooms? What alarmed you?'

"They all said the same thing. The scream. None of them had heard Sean knocking; the doors are too thick for that to be noticed. I know; I tried it myself later. You can hear a knock on another door only if you listen carefully. That scream must have been a hell of a loud one. The only person to hear the body drop to the floor at that time was Sean. None of the others had opened their doors yet. I couldn't establish which one of the other three came out first; none of them noticed. There was evidently too much confusion at the time.

"When the manager, Goodman Lewis, came back with the ax, I glanced at my watch. It was twenty-three minutes of ten. Approximately seven minutes had passed since Sean had knocked on the door.

"I used the ax myself. Everyone else stood back, well away from the door. I cut a good-sized area out of the center without damaging either the frame or the lock. I kept everyone else out and squeezed through the hole I'd cut.

"It was an ordinary room, twelve by fifteen, with a bathroom. Across the room were two windows, both shuttered and bolted, but the shutters had been adjusted to let in the daylight. The glass panes were closed and unbroken.

"The body of our Chief Forensic Sorcerer was almost exactly in the middle of the room, more than six feet from the door. He was lying on his left side, in a pool of fresh blood, and there was so much blood on his jacket that it was hard for me to see at first what had happened. Then I saw that there was a rip in his jacket, high up on the left side of his chest, above the heart. I opened his jacket for a look. There was a vertical stab wound in the chest at that point.

"A couple of feet away, lying in the pool of blood, near the edge, was a knife. It was a heavy-handled one, with a black onyx hilt and a solid silver blade. I've seen knives like that before, Lord Darcy, and so have you. A sorcerer's knife, used in certain spells for symbolically cutting psychic linkages or something of the sort. But they can cut physically as well as psychically.

"About halfway between the body and the door was a key, the

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same kind of heavy brass key that the manager had tried to open the door with. I marked the spot with one of my own keys and then tried the key on the door. It worked; it turned the bolt, but no other key would. It was Sir James' key, all right.

"I searched the body. Nothing much there—his own key ring; two golden sovereigns, three silver sovereigns, and some odd change; a notebook full of magical symbols and equations which I don't understand; an ordinary small pocketknife; a cardfolder which contained his certificate as a Master Sorcerer, his license to practice magic—signed by the Bishop of London—his official identification as Chief Forensic Sorcerer, a card identifying him as a Fellow of the Royal Thaumaturgical Society, and a few personal cards. You can look at it all, Darcy; My Lord Marquis has it in an envelope in the wall safe.

"He had three other suits, all hanging neatly in the closet, with nothing in the pockets. There were some papers on the desk, all filled with thaumaturgical symbolism, and more like them in the wastebasket. I left them where they were. The only other thing in the room was his symbol-decorated carpetbag—the kind every sorcerer carries. I didn't try to open it or move it; it is not wise to meddle with the belongings of magicians, even dead ones.

"The point is that there was nobody in that room but the dead man. I searched it carefully. There was no place to hide. I looked under the bed and in the closet and in the bathroom.

"Furthermore, nobody could have left by that door. It had been locked by the only key that would lock it, and that key was inside the room. Besides, there were four people in that corridor within seconds after Sir James screamed, and three of them were watching that door from that time until I cut it open.

"The windows were bolted shut from the inside. The glass and the laths in the shutters were solid. The windows look out on a small patio which is a part of the dining area. There were twelve people out there—all sorcerers—who were eating breakfast. None of them saw anything, although their attention was directed to the windows by the scream. Besides, the wall is sheer—a thirty-foot drop without ledges, handholds, or toeholds. No exit that way.

"There is no evidence that anyone went into that room or came out of it.

"By the time I had searched the room, the Chief Master-at-Arms and two of his men had arrived. You've met Chief Hennely Grayme—big, husky chap with a square face? Yes. Well, I told him to take over, to get a preservation spell cast over the body, and to touch nothing.

"Then I went back out in the hall

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and herded everybody out of there and into one of the empty rooms down the hall. The manager gave me the key and I told him to go on about his business.

"Commander Lord Ashley was a little impatient. He had already delivered his message to Master Sean and had to report back to the Lord Admiral's office, so I told him to go ahead. Sir Lyon, Master Sean, Master Netly, Journeyman Lord John Quetzal, and the Dowager Duchess of Cumberland all looked shocked at what they'd seen through the door, and none of them seemed to have much to say.

" 'Sir Lyon,' I said, 'that room was locked and sealed. Sir James was stabbed at a time when there was no one else in the room. What do you make of it?'

"He stroked his beard for a moment, then said: 'I understand your question. Yes, on first glance I should say that he was killed by Black Magic. But that is merely a supposition based upon the physical facts. I do not suppose you can detect it yourself, but this hotel is not at present equipped with just the ordinary commercial spells for privacy, to prevent unwarranted use of the clairvoyant Talent. Before the Convention started a special group of six sorcerers went through the entire building reinforcing those spells and adding others. They do not affect precognition, since there is no way to cast a spell into the future, but they prevent anyone from using his clairvoyant Talent to see into another's room, and they make it very difficult to understand or detect what is going on in someone else's mind. Before I can state flatly that Sir James was killed by Black Magic I should want further investigation into the facts.'

" 'There will be,' I told him. 'Next question, then: Who had reason to kill him? Had anyone quarreled with him?'

"So help me, Lord Darcy, every eye in the room turned to Sean. Except Sean's, of course.

"Naturally, I asked him what the quarrel was about.

" 'It wasn't a quarrel,' he said firmly. 'Both Sir James and I were angry, but not at each other.'

" 'Who were you angry with, then?'

" 'Not with anyone. We had both been working on a new thaumaturgical effect, and had discovered almost identical spells to produce that effect. It has happened before in the history of magic. We may have been growling and snapping at each other, but we weren't angry at anything but the coincidence.'

" 'How did the . . . er . . . discussion come about?' I asked him.

" 'Chance conversation in the committee room. We fell to talking and the subject came up. We compared notes, and . . . well, there it was. What we were really arguing about was who was to pre-

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sent his paper first. So we called Sir Lyon over to decide the problem.'

"I looked at Sir Lyon. He nodded. 'That's correct. I decided that it would be best for them to pool their findings and present the paper jointly, under both their names, with a full explanation that the work had been done by both independently.'

" 'Tell me, Sir Lyon,' I said, 'this paper—or these papers—wouldn't be just a lot of thaumaturgical equations, would they?'

" 'Oh, no. They would have a full exposition of the effect. There would be equations, of course, but the text would be in Anglo-French. Naturally, there would be a lot of technical words, jargon of the trade, if you will, but—'

" 'Where is Sir James' paper, then?' I asked. 'It isn't in his room.'

" 'I have it,' said Sean. 'It was agreed between Sir James and myself that I should do a first collation between the two papers, and then we'd talk the thing over this morning at nine-thirty and do a second draft of our collaboration.'

" 'When was the last time you saw Sir James?' I asked.

" 'Last evening at about ten, it was,' Sean explained. 'I went with him to his room, so he could give me his manuscript. So far as I know, that's the last anyone saw of him. He said he was going to do a little further work he had in mind, and that he didn't want to be disturbed until half past nine.'

" 'Would he have been using a knife for that work?'

" 'Knife?' he said, looking puzzled.

" 'You know. One of those big, black-handled silver knives.'

" 'Oh. You mean a contact cutter. I wouldn't think so; he said he wanted to do some paper work, is all. Not any actual experimentation. Still, I suppose it's possible.'

"I said, 'Sean, do you mind if I take a look at Sir James' manuscript?'

"I guess that must have fired his Irish temper up. 'I don't see what that has to do with this business,' he said peevishly. 'I've been working on this thing for three years. It was bad enough that Sir James was doing the same thing, but I'm not going to let out this information until I'm ready to present it myself!'

"Then Grand Master Sir Lyon spoke. 'I cannot insist that you show those papers to the Chief Investigator, Master Sean; I cannot ask you to reveal the process. But I feel that the subject may possibly have a bearing on the case.'

"Sean opened his mouth and then closed it again. After a second or so, he said: 'Well, that's already on the Program anyway. My paper was to have been called "A Method of Performing Surgery Upon Inaccessible Organs." Sir James called his "The Surgical Incision of Internal Organs Without Breaching the Abdominal Wall." '

"That was when Master Netly

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squeaked, 'You mean a method of controlling a blade within an enclosed space? Astounding!' Then he backed away from Sean a couple of steps. *'That's* what he meant when he screamed!'

"That was the first I'd heard that Master Sir James had actually screamed words. The words were—and they all agreed on it—

" *'Sean! Help!'* "

The Marquis of London had been sitting during the entire narration with his eyes closed, but he was not asleep. "Satisfactory," he said. Then he opened his eyes, looking at Lord Darcy. "Now," he rumbled, "you understand why I felt constrained to order the arrest of Master Sean O Lochlainn for suspicion of murder."

IV

Lord Darcy looked long and deeply into the eyes of My Lord Marquis, and the Marquis calmly returned that steady gaze. At last Lord Darcy said: "I see. Do you consider the evidence conclusive, then?"

"Oh, by no means," said the Marquis, patting the air with a heavy hand. "I certainly should not care to place the case before the Court of High Justice with the evidence now at hand. If I had that evidence, Master Sean would have already been charged with premeditated murder, not merely with suspicion."

"I see," Lord Darcy repeated, his voice icily polite. "Am I to presume that I will be expected to find that evidence?"

The Marquis de London lifted his massive shoulders perhaps a quarter of an inch and lowered them again. "It is a matter of indifference to me. However, understanding as I do your personal interest in the case, you may certainly count upon full co-operation from this office in any investigation you may care to undertake."

"Ahh. That's the way the wind blows, is it?" said Lord Darcy. "Very well. I accept your hospitality and your co-operation. Will you release Master Sean on his own recognizance until such time as the remainder of the evidence is in?"

My Lord Marquis frowned, and for the first time there seemed to be a touch of discomfort in his manner. "You know as well as I that a man arrested for a capital crime cannot be released on his own recognizance. Such is the law; I am powerless to abrogate the King's Law."

"Of course," murmured Lord Darcy. "Of course. I trust, however, that I may speak to Master Sean?"

"Naturally. He is in the Tower, and I have given orders that he is to be made comfortable. You may see him at any time."

Lord Darcy rose to his feet. "My thanks, my lord. In that case, I shall go about my business. May I have your leave to go?"

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"You have my leave, my lord. Lord Bontriomphe will see you to the door." The Marquis of London rose ponderously to his feet and walked out of his office without another word.

Lord Darcy said nothing to Lord Bontriomphe until both of them were standing at the front door. Then he said: "My Lord Marquis likes to play games, Bontriomphe."

"Hm-m-m. Yes. Yes, he does." Bontriomphe paused. "I am certain you can handle this, Darcy."

"I think so. Don't be surprised by anything."

"I shan't. Good evening, my lord."

"Good evening. I shall see you on the morrow."

Master Sean O Lochlainn, in his comfortable room in that ancient fortress known as the Tower of London, was no longer angry—not even at Fate. The emotion that filled him now was a sort of determined patience. He knew Lord Darcy would come, and he knew that his imprisonment was purely nominal.

Earlier in the afternoon, when he had found himself charged with suspicion of murder, he had felt some small pique when he was told that he would not be allowed to bring his symbol-decorated carpetbag to the Tower with him. Locking up a sorcerer is difficult enough in itself; to allow him to have the tools of his trade would be foolish indeed.

But the Tower Warders had erred in thinking that a sorcerer was helpless without his tools. They had not taken into account a certain spell that Master Sean had long since cast upon that symbol-decorated carpetbag. The effect of that spell can be expressed simply: The tools of a sorcerer cannot long be separated from their Master against his will. And the way the spell worked in practice was thus:

The carpetbag had been locked in Master Sean's room at the Royal Steward Arms, to remain there until such time as Master Sean's ultimate disposition should be decided. That had been ordered by the Chief Master-at-Arms at the time of Master Sean's arrest. Master Sean had delivered his key to the Chief Master-at-Arms in polite submission to the majesty of the law. But there had not been any special spell on the lock of Master Sean's room, such as there had been on the late Master James Zwinge's room. Therefore, when one of the hotel servants was making her cleaning rounds at one o'clock that afternoon, she had had with her a key to Master Sean's room—a key that would work.

Quite naturally, Bridget Courville took each room as she came to it. When she came to Master Sean's room, she went in and looked around.

"All's neat," she said to herself. "Bed unmade, but of course that's the way it always is. Ah, these sorcerers are neat enough, for sure. No

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bottles or trash scattered about. Not drinkers, much, I think. Which it shouldn't be for a sorcerer."

She tidied up—made the bed, laid out clean towels, put in new soap bars, and did all the other little things that needed to be done.

She noticed the symbol-decorated carpetbag, of course. There was one like it in almost every room during this convention. But she paid no attention to it consciously.

Her subconscious, however, whispered to her that "it didn't ought to be here."

It can be said that Bridget Courville really didn't think about what she was doing when she picked up the bag and set it out in the hall before she locked up the room and went on to the next one.

At one fifteen, a catering servant —a young lad in his late teens whose duty it was to see that drinks and food were brought to the guests when they were ordered—saw the bag sitting in the hall. It seemed out of place. Without bothering to think about it, he picked it up and took it downstairs. He left it on the luggage rack near the front entrance and promptly forgot about it.

Hennely Grayme, Chief Master-at-Arms for the City of London, having made all the notes he could on the scene of the crime, left the hotel at five minutes of two. He stopped near the door and saw the carpetbag on the luggage rack. He noticed the initials *S. O L.* on the handle. Automatically, he picked it up and took it with him. When he stopped by at the Tower, he said a few words to the Chief Warder and, without mentioning it, left the carpetbag behind.

The carpetbag remained unnoticed in the anteroom of the Chief Warder's office until fifteen minutes of three. During that time, many people went in and out of that anteroom without noticing the bag; none of them were going in the right direction.

At two forty-five, the Warder in charge of the cell in which Master Sean was incarcerated saw the bag. On his way out, after reporting to the Chief Warder, he picked up the bag.

Had he been going off duty, had he been going to the Middle Tower instead of St. Thomas' Tower, he would not even have noticed the symbol-decorated carpetbag. The spell was specific. But he did pick it up, and he did carry it up the spiral staircase to Master Sean's cell.

He unlocked the door to Master Sean's cell, then knocked politely.

"Master Sean, it is I, Warder Linsy."

"Come in, me boy, come in," said Master Sean jovially.

The door opened, and when Master Sean saw the carpetbag in the Warder's hand, he suppressed a smile and said: "What can I do for you, Warder?"

"I was to come up and see what you wanted for dinner, Master,"

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Warder Linsy said deferentially. Absently he put the bag down inside the door.

"Ah, it's of no matter to me, my good Warder," said Master Sean. "Whatever the Chief Warder orders will be good enough for me."

Warder Linsy smiled. "That's good of you, Master." Then he lowered his voice. "Ain't none of us thinks you done it, Master Sean. We knows a sorcerer couldn't of killed a man. Not that way, I mean. Not by black magic."

"Thank you for your confidence, me boy," Master Sean said expansively. "I assure you it's not misplaced. Now, if you'll excuse me, I have some thinking to do."

"Of course, Master. Of course." And Warder Linsy closed the door, locked it carefully, and went on about his business.

Lord Darcy's trip from the Palace du Marquis to the Tower of London was uneventful. The cab clattered out of Mark Lane, swerved, and descended Tower Hill. In Water Lane, at the gate, it stopped. Lord Darcy stepped out.

A heavy, whitish fog drifted through the bars of the great iron fence and clung to the shadows of the Gothic archways. There was a fading sound of bells as the ships on the Thames moved through the mist-laden waters. The air was muggy, and a faint smell of marine decay drifted over the wall that formed one side of the fortress. Lord Darcy wrinkled his nostrils at the aroma that assailed them, and then walked over the stone bridge that led from the Middle Tower to another tower —larger and gray-black, with a few whitish stones here and there in its walls. There was another archway, then a short, straight path, and then Lord Darcy turned toward the right and entered St. Thomas' Tower.

Within a few minutes, the Warder was unlocking the door to Master Sean's cell. "Call me when you wants to leave, your lordship," he said. He left, closing the door and relocking it.

"Well, Master Sean," said Lord Darcy with a spark of humor in his gray eyes, "I trust you are enjoying this idyllic relaxation from your onerous duties, eh?"

"Hm-m-m—yes and no, my lord," said the tubby little sorcerer. He waved a hand at the small plain table on which his carpetbag sat. "I can't say I enjoy being locked up, but it has given me an opportunity to experiment and meditate."

"Indeed? Upon what?"

"Upon getting in and out of locked rooms, my lord."

"And what have you learned, my good Sean?" Lord Darcy asked.

"I've learned that the security system here is quite good, but not quite good enough. To hold *me* in, I mean. The spell on that lock took me ten minutes to solve." He picked up a small wand of gleaming brass and twirled it between thumb and

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forefinger. "I relocked it, of course, my lord. No need to disturb the Warder, who's a decent sort of fellow."

"I see you regained possession of your bag of equipment easily enough. Well, one could hardly expect an ordinary prison magician to compete with a Master Sorcerer of your capabilities. Now pray be seated and explain to me in detail how you came to be incarcerated in one of London's oldest landmarks. Omit no detail."

Lord Darcy did not interrupt while Master Sean told his story. He had worked with the little sorcerer for years; he knew that Sean's memory was accurate and complete.

"And then," Master Sean finished, "Lord Bontriomphe brought me here—with, I must say, sincere apologies. I can't for the life of me see why the Marquis should order me locked up, though. Surely a man of his abilities should be able to see that I had nothing to do with Sir James' death."

Lord Darcy scooped tobacco from a leathern pouch and thumbed it into the gold-worked porcelain bowl of his favorite pipe. "Of course he knows you're innocent, my dear Sean," he said crisply. "My Lord Marquis is a parsimonious man and a lazy one. Bontriomphe is an excellent investigator, but he lacks the deductive faculty in its highest form. My Lord Marquis, on the other hand, is capable of brilliant reasoning, but he is both physically and mentally indolent. He leaves his own home but rarely, and never for the purpose of criminal investigation. When he is pressured into doing so, My Lord Marquis is perfectly capable of solving some of the most intricate and complex puzzles with nothing more to work with than the verbal reports given him by Lord Bontriomphe. His mind is —brilliant." Lord Darcy lit his pipe and surrounded himself with a cloud of fragrant smoke.

"Coming from you," said Master Sean, "that's quite a compliment."

"Not at all. It is merely a statement of fact. Perhaps it runs in the blood; we are cousins, you know."

Master Sean nodded. "At least the laziness doesn't run in the blood, my lord. But why lock me up because he's lazy?"

"Lazy *and* parsimonious, my good Sean," Lord Darcy corrected the sorcerer. "Both factors apply. He has already recognized that this case is far too complex for the relatively feeble powers of Lord Bontriomphe to cope with." Lord Darcy smiled and took the pipe from his lips. "You said a moment ago that I had complimented my lord's brilliancy. If that is so, then he has, in his own way, paid the same compliment to me. He is mentally lazy; therefore, he wishes to get someone else to do the work—someone competent to solve the problem with

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the same facility with which he would do it himself, were he to apply his mind. He has chosen me, and I flatter myself that he would not have chosen any other man."

"That still doesn't explain why he locked me up," Master Sean said. "He could have just asked you for assistance."

Lord Darcy sighed. "You have forgotten his parsimony again, my good Sean. Were he to ask His Royal Highness of Normandy to spare my services for a short while, he would be obligated to pay my salary from his own Privy Purse. But by incarcerating you, he deprives me of my most valued assistant. He knows I would not suffer you to be imprisoned one second longer than necessary. He knows that putting you in the Tower would force me to take a leave of absence, to solve the case on my own time, thereby saving himself a pretty penny."

"Blackmail," said Master Sean.

"'Blackmail' is perhaps too strong a word," Lord Darcy said thoughtfully, "but I will admit that no other is quite strong enough. That problem, however, will be taken care of in its own time. At the moment, we are concerned with the death of Sir James.

"Now—what about the lock on Sir James' room?"

Master Sean settled himself deeper into his chair. "Well, my lord, as you know, most commercial spells are pretty simple, especially those where more than one key has to be used, as they have in a hotel."

Lord Darcy nodded patiently. Master Sean O Lochlainn had a rather pedagogical habit of framing his explanations as though they were lectures to be used in the training of apprentice sorcerers—which was not surprising, since the tubby little master magician had at one time taught in one of the Sorcerers' Guild's schools and had written two textbooks and several monographs upon the subject. Lord Darcy had long ago formed the habit of listening, even though he had heard parts of each lecture before, for there was always something to be learned, something new to be stored away in the memory for future reference. Lord Darcy did not have the inborn Talent necessary to make use of the Laws of Magic directly, but one never knows when some esoteric bit of data might become pertinent and useful to a criminal investigator.

"The average commercial spell uses the Law of Contagion, so that every key which touches the lock during the casting of the spell will unlock and lock it," Master Sean continued. "But that means a relative weakening of the spell. An ordinary duplicate key won't work the lock, but any good apprentice o' the Guild could break the spell if he had such a duplicate. And any Master could break it *without* the key in a minute or two.

"But a personal spell by a Mas-

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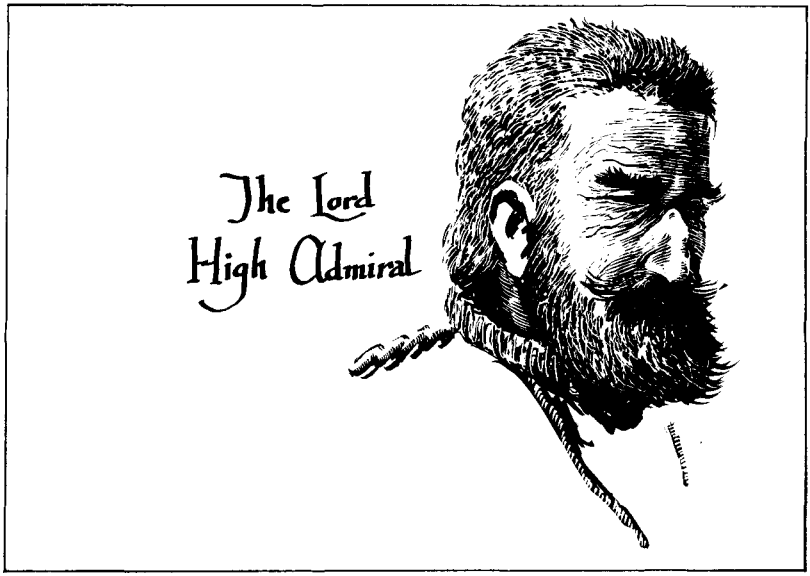

ter uses the Law of Relevance to bind the whole lock-and-key mechanism together as a unit—one key, one lock. The spell is cast with the key in the lock, so that the binding considers the key simply as a detachable part of the mechanism, if you follow me, my lord. No other key will work, either to lock or to unlock the mechanism, even if it is so physically like the proper key that they couldn't be told apart."

"And Master Sir James' key-and-lock had that sort of spell on it, eh?" Lord Darcy asked.

"That it did, my lord."

"Could a Master Sorcerer have removed the spell?"

Master Sean nodded. "Aye, that he could—in half an hour. But look what that would entail, my lord."

"The Unknown would have to stand in that corridor for at least half an hour, maybe more, going through the proper ritual. Anyone who came by during that time couldn't help but notice. Certainly Master Sir James would have noticed if he was inside the room.

"But let's say the Unknown actually does that. Now he opens the door with an ordinary duplicate, goes inside, and kills Master Sir James. Fine.

"Then he comes out, and casts *another* spell on the lock-and-key —with the key in the lock, as it must be. That takes him another half hour.

"And *then* . . ."

Master Sean held up his forefinger dramatically.

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". . . And *then—he has to get that key back into the room!*"

Master Sean spread his hands, palms upward. "I submit that it isn't possible, my lord. Not even for a magician."

Lord Darcy puffed thoughtfully at his pipe for the space of two seconds. Then he said: "Is it not theoretically possible to move an object traversing the space between the two points?"

"Theoretically?" Master Sean made a wry grin. "Oh, yes, my lord. *Theoretically*, The Transmutation of metals is theoretically possible, too. But, like instantaneous transportation, no one has ever done it. If anyone did solve the rites and ceremonies necessary, it would be the biggest scientific breakthrough of the Twentieth Century. It couldn't be kept quiet. It is simply beyond our present stage of science, my lord.

"And when and if it is ever done, my lord, the process will not be used for such minor things as moving a big brass key a few feet."

"Very well, then," said his lordship, "we can eliminate that."

"The trouble is," said Master Sean, "that all those heavy privacy spells make it difficult for a man to do his work properly. If it weren't for them, your job would be simple."

"My dear Sean," said Lord Darcy with a smile, "if it were not for the privacy spells used in every hotel, private home, office building, and in public structures of all kinds, my job would not be simple, it would be nonexistent.

"Although the clairvoyant Talent is no doubt a useful one, its indiscriminate use leads to so much encroachment upon personal privacy and individual rights that we must protect ourselves from it. Imagine what a clairvoyant could do in a world where such protective spells were not used. There would be no need for investigators like myself. In such a world the police would have merely to bring the case to the attention of a clairvoyant, who would immediately inform them of how the crime was committed and who had committed it.

"On the other hand, think what opportunity there would be for a corrupt government to employ such clairvoyants to spy upon private citizens for their own nefarious purposes. Or think of the opportunities for criminal blackmail.

"We must be thankful that modern privacy spells protect us from such improper uses of the Talent, even though it makes physical investigation of a crime necessary. Even as it is, I am never called upon when something happens in the countryside. If a person is killed in a field or in a forest, a journeyman sorcerer working for the local Armsmen can easily take care of the job—as easily as he finds lost children and strayed animals. It is in the cities, towns and villages

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where my ability to deduce facts from physical and thaumaturgical evidence makes me useful.

"It is my job to find method, motive, and opportunity." He took a small, silver, ivory-handled tool from his pocket and began tamping the ashes in his pipe. "Method, motive and opportunity," he repeated thoughtfully. "So far we have no candidates for the first two and entirely too many for the last." He returned the tamper to his pocket and the pipe to his mouth.

"Normally, my dear Sean," he continued, "when a case appears to have magical elements in it, finding the magician involved is a prime factor in the problem. You will recall the interesting behavior of Laird Duncan at Castle D'Evreux, the curious habits of the one-armed tinker at the Michaelmas Fair, the Polish sorcerer in the Atlantic Curse problem, the missing magician in the Canterbury blackmail case, and the odd affair of Lady Overleigh's solid gold chamber pot. In each case, only one sorcerer was directly involved.

"But what have we here?" Lord Darcy gestured with his pipe in the general direction of the Royal Steward Hotel. "We have nearly half the licensed sorcerers of the Empire, a collection that includes some seventy-five or eighty percent of the most powerful magicians on Earth.

"We are faced with a plenitude—indeed, a plethora—of suspects, all of whom have the ability to use black magic against Master Sir James Zwinge, and had the opportunity of doing so.

Master Sean thoughtfully massaged his round Irish nose between the thumb and forefinger of his left hand. "I can't understand why any of 'em would do it, my lord. Every Guild member knows the danger of it. '*The mental state necessary to use the Talent for black sorcery is such that it invariably destroys the user.*' That's a quote from one of the basic textbooks, my lord, and every *grimoire* contains a variation of it. How could any sorcerer *be* so stupid?"

"Why do chirurgeons occasionally become addicts of the poppy distillates?" Lord Darcy asked.

"I know, my lord; I know," Master Sean said wearily. "*One* act of black magic isn't fatal; it doesn't even cause any detectable mental or moral change in many cases. But the operative word there is 'detectable.' And that's because the moral rot must already have set in before a man with the Talent would even *consider* practicing black magic."

Even though it had happened before and would happen again, no member of the Guild of Sorcerers liked the idea that any single other member would resort to the perversion of his Art that constituted Black Magic.

Not that they were afraid to face it—oh, no! Face it they must, and

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face it they did—with a vengeance. Lord Darcy knew—although very few who were not high-ranking Masters of the Guild had that knowledge—exactly what happened to a member who was found guilty of using his Talent for evil.

Destruction!

The evil sorcerer, convicted by his own mind, convicted by the analysis of a true Jury of his true Peers, convicted by those who could really understand and sympathize with his motives and reasons, was condemned to have his Talent . . .

. . . Removed.

. . . Obliterated.

. . . Destroyed.

A Committee of Executors was appointed—a group of sorcerers large enough and powerful enough to overcome the Talent-power of the guilty man.

And when they were through, the convicted man had lost nothing but his Talent. His knowledge, his memory, his morals, his sanity—all remained the same. But his ability to perform magic was gone . . . never to return.

"Meanwhile," said Lord Darcy, "we have a problem of our own. Commander Lord Ashley gave you my message?"

"Indeed he did, my lord."

"I hate having to take you away from the Convention, my good Sean; I know what it means to you. But this is no ordinary murder; it concerns the security of the Empire."

"I know, my lord," said Master Sean, "duty is duty." But there was a touch of sadness in his voice. "I did rather want to present my paper, but it will be published in the Journal, which will be just as good."

"Hm-m-m," said Lord Darcy. "When were you scheduled to present your paper?"

"On Saturday, my lord. Master Sir James and I were going to combine our papers and present them jointly, but of course that is out of the question now. They'll have to be published separately."

"Saturday, eh?" said Lord Darcy. "Well, if we can get back to Cherbourg by tomorrow afternoon, I should say that most of the urgent work will be cleared up within twenty-four hours, say by Friday afternoon. You could take the evening boat back and be in time to present both your paper and the late Master Sir James'."

Master Sean brightened. "That's good of you, my lord! But you'll have to get me out o' this plush cell if we're to get the job done!"

"Hah!" Lord Darcy shot suddenly to his feet. "My dear Master Sean, *that* problem has, I think, already been solved—although it may take a little time to make the . . . er . . . proper arrangements. And now I shall bid you good night; I shall see you again tomorrow."

V

The fog had thickened in the

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courtyard below the high, embattled walls surrounding the Tower of London, and beyond the Water Lane gate the world seemed to have disappeared into a wall of impalpable cotton wool. The gas lamps in the courtyard and above the gate seemed to be shedding their light into nothingness.

"Had you no one waitin' for you, your lordship?" asked the Sergeant Warder as he stood on the steps with Lord Darcy.

"No," Lord Darcy admitted. "I came in a cab. I must confess I failed to check with the weather prognostication. How long is the fog to last?"

"According to the chief sorcerer at the Weather Office, your lordship, it isn't due to break up until five minutes after five o'clock in the morning. It's to turn to a light drizzle, which will clear at six twelve."

"Well, I certainly can't stay here until sun-up," Lord Darcy said ruefully.

"I'll have the man at the gate see if he can't whistle you up a cab, your lordship; it's still fairly early. You can wait in the outer—" He stopped. From somewhere in the fog that choked Water Lane came the clatter of hooves and the rattle of wheels, becoming increasingly louder.

"That may be a cab, now, your lordship!" He raised his authoritative voice to a commanding bellow: *"Warden Jason! Signal that cab!"*

"Yes, Sergeant!" came a fog-muf-

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fled voice from the gate, followed immediately by the shrill *beep! beep! beep!* of a cab whistle.

"I fear we are to be disappointed, Sergeant," Lord Darcy said. "Your ears should tell you that the vehicle approaching is drawn by a pair; therefore, it is a private town-carriage, not a public cab. There is no cabman in the whole of London who would be so profligate as to use two horses where one will do."

The Sergeant Warder cocked one ear toward the sound. "Hm-m-m. Dare say you're right, your lordship. It *do* sound like a pair, now I listen closer. Still . . ."

"They are a well-trained pair," said his lordship. "Almost perfectly in step. But since two hooves cannot possibly strike the paving stones at precisely the same instant, there is a slight echo effect, clearly discernible to the trained ear."

The beeping sound of the whistle had stopped. Evidently the Warder at the gate had realized that the approaching vehicle was not a cab.

Nonetheless, the carriage could be heard to slow and stop outside the gate. After a moment, the reins snapped, and the horses started again. The carriage was turning, coming in the gate. It loomed suddenly out of the fog, seeming to coalesce into solidity out of the very substance of the rolling mist itself. It came to a halt at the curbing stone several yards away, still shadowy in the feeble yellow glow of the gas lamps.

Then a voice called out quite clearly from within it: "Lord Darcy! Is that you?"

It was plainly a feminine voice, and quite familiar, but because of the muffling effect of the fog and the distorting effect of the interior of the cab, Lord Darcy did not recognize it immediately. He knew that, standing almost directly under the gas lamp as he was, his own features stood out rather clearly at that distance.

"You have the advantage of me, my lady," he said.

There was a low laugh. "You mean you can't even read arms anymore?"

Lord Darcy had already noticed that a coat-of-arms was emblazoned on the door of the coach, but it was impossible to make it out in this light. There was no need to, however; Lord Darcy had recognized the voice upon the second hearing of it.

"Even the brilliancy of the arms of Cumberland can be dimmed beyond recognition in a London pea-soup," Lord Darcy said as he walked toward the vehicle. "Your Grace should have more than just the regulation night-lights and fog-lights if you want your arms to be recognized on a night like this."

He could see her clearly now; the beautiful face and the cloud of golden hair were only slightly dimmed by shadow and fog.

"I'm alone," she said very softly.

"Hullo, Mary," Lord Darcy said

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with equal softness. "What the deuce are you doing here?"

"Why, I came to fetch *you,* of course," said Mary, Dowager Duchess of Cumberland. "You dismissed your cab earlier because you didn't think about the fog coming, so now you're marooned. There isn't a cab to be had this side of St. Paul's. Get in, my dear, and let's leave this depressing prison."

Lord Darcy turned toward the Sergeant Warder, who still stood beneath the gas lamp. "Thank you for your efforts, Sergeant. I shan't need a cab. Her Grace has very kindly offered transportation."

"Very good, your lordship. Goodnight, your lordship. Good night, Your Grace."

They wished the Sergeant Warder a good night, Lord Darcy climbed into the carriage, and, at a word from Her Grace, the coachman snapped his reins and the carriage moved off into the swirling fog.

The Duchess pulled down the blinds and turned up the lamp in the top of the coach so that the two passengers could see each other clearly.

"You're looking well, my dear," she said.

"And you are a beautiful as ever," Lord Darcy replied. There was a mocking glint in his eyes that Her Grace of Cumberland could not quite fathom. "Where would you like to go?" she asked, trying to probe that look with her own startlingly dark-blue eyes.

"Anywhere you'd like, my sweet. We could just drive about London for a while—for however long it takes you to tell me all about the important information you have regarding this morning's murder of Master Sir James Zwinge."

Her eyes widened. For a moment, she said nothing. Then! "Damn! How did you know?"

"I deduced it."

"Rot!"

"Not at all. You have a keen mind, my dear; you should be able to follow my reasoning."

Again there was a silence, this time for nearly a minute, as Mary de Cumberland looked unblinkingly at Lord Darcy, her mind working rapidly. Then she gave her head a quick shake. "You have some information I don't."

"I think not. Unless, perhaps, I know how your mind works better than you do. You have the delightful habit, my dear, of making a man feel as though he were terribly important to you—even when you have to tell small lies to do it."

She smiled. "You *are* important to me, darling. Furthermore, small lies are necessary to good manners and to diplomacy; there is no harm in them. And what, pray, does that have to do with your pretended deduction?"

"That was unworthy of you, my dear. You know I never pretend to mental abilities other than those I actually possess." His voice had an edge.

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She smiled contritely and put out a hand to touch his arm. "I know. I apologize. Please explain."

Lord Darcy's smile returned. He put his hand on hers. "Apology accepted. Explanation—a simple one—as follows:

"You claimed that you had come to fetch me at the Tower. Now, I know that, aside from myself, the Warders at the Tower, Master Sean, and two other people, no one in London knew of my whereabouts or could have learned it by other than thaumaturgical means. No one but those even knew I was in London. You are a sorceress, true, but only journeyman, and we both know you are not prescient to any degree above normal. You might have deduced that I would come immediately I heard of Master Sean's arrest, but you could not possibly have known at exactly what time I would leave the Tower. Ergo, your arrival was a coincidence.

"However, as your coach approached the gate, you heard the Warder whistling for a cab. You would not have stopped for that; you stopped to identify yourself to the Warder so that you could enter the courtyard. Therefore, your destination must have been the Tower itself; if it were not, you would have gone on by, ignoring the whistle.

"Then you came on in and saw me. The very tone of your voice when you hailed me showed that you had not expected to see me there.

"Your reasoning powers are well above average; it was hardly the the work of a mental giant, however, to deduce from the whistle and my presence in the courtyard that it was I who desired a cab. Knowing, as you do, that I am not careless by habit, you further deduced that, having but recently arrived in London, I had failed to notice the fog prediction in the *Courier,* and had dismissed the cab that brought me. Thereupon, you spoke your flattering and entirely audacious little piece about having come to get me."

Her laugh was soft and throaty. "It wasn't a lie intended to deceive you, my dear."

"I know. You wanted me to gasp in amazement and say: 'Goodness me! How*ever* did you know I was going to be here? Have you become a seer, then?' And you would have smiled and looked wise and said: 'Oh, I have my ways.' "

She laughed again. "You know me too well, my lord. But what has all that to do with your knowing I had information about the death of Master Sir James?"

"We return to the coincidence of your arrival at the Tower," Lord Darcy said. "If you had not come for me, then what was your purpose? It must have been important, else you would not have come out on so foggy a night. And yet, the moment you see *me,* you ask me to get in, and off we go. Whatever bus-

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iness you had at the Tower can be conducted with me, eh? Obviously, you went to tell Master Sean something, but not something strictly personal. Ergo—" He smiled, letting the conclusion go unsaid.

"One day," said the Dowager Duchess of Cumberland, "I shall learn not to try to beat you at your own game."

"But not, I pray, too soon," said Lord Darcy. "Few people of either sex bother to exercise their intellect; it is refreshing to know a woman who does."

"Alas!" Her voice was heavy with mock tragedy. "He loves me only for my mind!"

"*Mens sana in corpore sano,* my dear. Now let's get back to this information you have."

"Very well," she said, looking suddenly thoughtful. "I don't know whether it means anything or not; I'll give it to you for what it's worth and let you decide whether to follow it up."

Lord Darcy nodded. "Go ahead."

"It was something I saw—and heard," said Mary de Cumberland. "At seven minutes of eight this morning—I noticed the time particularly because I had an appointment for breakfast at eight-fifteen —I left my room at the hotel." She stopped and looked directly into his eyes. "I have the room directly across the hall from Master Sir James'. Did you know that?"

"Yes."

"Very well, then. I opened the door. I heard a voice coming through the door of the room opposite. As you know, the doors at the Royal Steward are quite thick; normal conversation won't carry through. But this was a woman's voice, not high in pitch, but quite strong and quite penetrating. Her words were very clear. She said—"

"Wait." Lord Darcy lifted a hand, interrupting her. "Can you repeat the words *exactly,* Mary?"

"I can; yes," the Duchess said firmly. "She said: 'By God, Sir James! You condemn him to death! I warn you! If *he* dies, *you* die!' "

There was a pause, a silence broken only by the clatter of hooves and the soft sussuration of pneumatic tires on the street.

"And the intonation that you have just reproduced," Lord Darcy said, "is that accurate? She sounded both angry and frightened?"

"More anger than fright, but there was certainly a touch of fear."

"Very good. Then what?"

"Then there was a very faint sound—as of someone speaking in a more normal tone of voice. It was hardly audible, much less recognizable or understandable."

"It could have been Sir James speaking?"

"It could have. It could have been anyone. I assumed, of course, at the time, that it *was* Sir James—but actually it could have been anyone."

"Or even no one?"

She thought for a second. "No.

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No, there was someone else in that room besides her."

"How do you know?"

"Because just then the door flew open and the girl came flouncing out. She slammed it shut behind her and went on down the hall without even noticing me—or, at least, not indicating it if she had. Then whoever was still in the room put a key in the lock and locked the door. Naturally, I had not intended to be a witness to such a scene; I ignored it and went on down to breakfast."

"Who was the girl?" Lord Darcy asked.

"To my knowledge, I had never seen her before," the Duchess said, "and she was certainly the kind of girl one would not easily forget. She is a tiny creature—not five feet tall, —but perfectly formed, a truly beautiful figure. Her hair is jet black and quite long, and was bound with a silver circlet in back, giving it a sort of horse-tail appearance. Her face was as beautiful as the rest of her, with pixieish eyes and a rather sensuous mouth. She was wearing the costume of an apprentice—blue, with a white band at the sleeve—and that's odd, because, as you know, apprentices are allowed at the Convention only by special invitation, and such invitations are quite rare."

"It is even odder," Lord Darcy said musingly, "that an apprentice should use such speech towards a Master of the Art."

"Yes, it is," Her Grace agreed. "But, as I said, I really thought little of it at the time. After Master Sean was arrested, however, the incident came to mind again. I spent the rest of the morning and all afternoon trying to find out what I could about her."

"And yet you did not think it important enough to mention it either to Lord Bontriomphe or to the Chief Master-at-Arms?" Lord Darcy asked quietly.

"Important? Of course I thought it was important! I still do. But—mention it to the Armsmen? To what purpose, my dear? In the first place, I had no real information; at the time, I didn't even know her name. In the second place, that was an hour and a half before the murder actually took place. In the third place, if I had told either Bontriomphe or Chief Master Hennely about it, they would simply have bungled the whole thing by arresting her, too, and they would have had no more case against her than they do against Master Sean."

"And in the fourth place," Lord Darcy added, "you fancy yourself a detective. Go ahead. What did you find out?"

"Not much," she admitted. "I found her name easily enough in the Grand Register of the Convention. She's the only female apprentice listed. The name is Tia Einzig. T-I-A E-I-N-Z-I-G."

"Einzig?" Lord Darcy lifted an eyebrow. "Germanic, definitely. Possibly Prussian, which would, no

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doubt, make her a Polish subject."

"The name may be Prussian; she isn't," said Her Grace. "She is, however—or was—a subject of His Slavonic Majesty. She came from some little place on the eastern side of the Danube, a few hundred miles from the Adriatic coast—one of those towns with sixteen letters in its name, only three of which are vowels. K-D-J-A-something. She left in 1961 for the Grand Duchy of Venetia and lived in Belluno for about a year. Then she was in Milano for a couple of months, then went on to Torino. In 1963, she came to France, to live in Grenoble. All this came out last year, when her case was brought to Raymond's attention."

"Raymond?"

"His Grace, the Duke of Dauphine," Mary de Cumberland explained. "Naturally, a request for extradition would have to be brought to his personal attention."

"Naturally." The sardonic light had returned to Lord Darcy's eyes, and now it gleamed dangerously. "Mary."

"Yes?"

"I retract what I said about your being a woman who uses her intellect. The rational mind marshals its facts and reports them in a logical order. This is the first I have heard of any extradition proceedings."

"Oh." She flashed him a brilliant smile. "I'm sorry, my dear. I—"

He cut her off. "First, may I ask where you got this information? You certainly didn't pop off to Dauphine this afternoon and ask your old friend the Duke to let you look at the Legal Proceedings Record of the Duchy of Dauphine."

"How did you know he was an old friend?" the Dowager Duchess asked. "I don't recall ever having mentioned it to you before."

"You haven't. You are not a woman who parades the names of influential friends. Neither would you call an Imperial Governor by his Christian name alone unless you were a close friend. That is neither here nor there. I repeat: What is your source for this history of Tia Einzig?"

"Father Dominique. The Reverend Father Dominique ap Tewdwr, O.S.B., who was the Sensitive in charge of the clerical commission which the Archbishop appointed to investigate the personality of Tia Einzig. His Grace the Duke asked that the commission be appointed to make the investigation because of the charges that were made against her in Belluno, Milano, and Torino —the requests for extradition, so that she could be tried locally on the charges against her."

"What were those charges, specifically?"

"The same in all three cases. Practicing sorcery without a license, and . . ."

"And?"

"And black magic."

TO BE CONTINUED

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Omar Khayyam wondered what it was the vintners—they didn't have distillers in his day—bought that was one half as precious as the stuff they sold. One answer might have been freedom!

"Over here ladies and gentlemen," the guide continued his spiel while expertly shepherding the gawking and awkward tourists across the hall, "is the original Charter by which the Republic of Luna declared its independence from the United Nations."

I could tell that most of them were groundhogs from the way they stumbled about in the low gravity. Grinning to myself, I turned away and went back into my office, closing the door softly.

I had heard the narrative many times before, in fact I had written the first draft. As with all patriotic national legends, it was full of platitudes and nonsense, barely touching upon the actual truth. If you listened closely, you would come away

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SPIRITS OF '76 | JOE POYER

Leo Summers

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believing that the Republic of Luna was founded for high and noble purposes. All patriotic stories would have you believe that. Nobody remembers, for instance, that John Hancock owed the British Crown £100,000 or that John Adams owed £10,000 and that the first thing the new government did was to abrogate all foreign debts.

But then, perhaps the Republic was founded for high and noble purposes—as high as any I guess. We do make what many consider to be outrageous attempts to preserve the freedom and dignity of the individual. For instance, you will see no police anywhere in the Republic—everyone goes armed. We have a crime rate, yes, but it is very low, but we also have a select population. We like it that way and our standard answer to those who don't is: "So, go home then."

High and Noble Purposes? So the records indicate. A revolutionary government that threw off the oppressive shackles of the United Nations? Of course, that is if you can really find any oppressions and still keep a straight face. But it was a completely bloodless revolution. Only one shot was fired and the recipient—in absolutely no danger at the time—merely sulked for a while and then forgot about it.

But, if the actual truth were known, the Republic of Luna was founded as the outcome—a completely accidental outcome—of a tremendous drunk!

I had never felt so foolish in my life as the tractor bumped over the last long rise and the slope fell away to reveal a shimmering, pearly-gray pressure dome nestled against a massive rock formation. In front of the dome a pressure-suited figure was working in slow motion, shoveling lunar soil around the walls of the dome. The loose dirt shunted up slowly from the shovel and before it had time to fall, another shovelful followed. The impression was one of a steady stream of dirt spraying from the ground to cover the walls.

I was so deeply engrossed in my own thoughts that I missed the comment my driver made over the suit intercom. Ever since accepting my present assignment as the United States Justice Department representative to the United Nations, I had received some mighty silly assignments, but this one . . . this one really took the prize!

And so, here I was, bumping along less than fifty kilometers from the Lunar North Pole, crawling over the God-forsaken surface of the moon, a brand-new cardboard United Nations' marshal's badge taped to my pressure suit, my attaché case full of eviction papers for one Robert Thompson, and, a sawed-off shotgun to enforce my legal title. I felt like Wyatt Earp riding down on one of the Clanton brothers.

The driver shut off his radio and motioned for me to do the same.

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Touching helmets, he pointed out the American flag above the dome, bright in the harsh sunlight. I noticed that it seemed to be rippling, as if in a stiff breeze, while the United Nations' flag dangled limply below.

"Last time I was up here, he ran me off," the driver shouted. "You can see where he nicked the paint with buckshot"—he jerked a gloved thumb to the rear—"back there on the aft fuel cell cover. So watch yourself!"

I did not say anything, just nodded and resumed studying Thompson's layout as we half slid down the graveled slope. I could see the pressure dome clearly, and beyond, what appeared to be a small outbuilding. Other than that, not much else because of the deep shadows thrown by the sunlight. The driver straightened and turned the tractor broadside to the dome, coming to a halt about fifty meters away.

I switched my radio back on and climbed stiffly out of the tractor seat and shuffled down the slope to where Thompson was waiting. I could see him lay the shovel against the dome wall and pick up a shotgun. He did not point it, just let it rest across his arm, looking for all the world like a Kentucky mountain man.

He waited patiently as I puffed up. His helmet, with the filter polarized against the harsh sunlight, gave him a blank, outworldly appearance, that was heightened by the surroundings. I had spent the last two days studying photographs and records of this strange, self-reliant man, and I supposed I knew as much about him as anyone possibly could know about another from government records. Thompson was quite intelligent, stubborn, and his ancestry was English-Welsh and I guessed that this had a lot to do with his stubborn streak. Anyway he was waiting for me, here on the *moon*, at his *own* pressure dome, and, on what he claimed was his *own* land.

"Howdy . . . Something I can do for you?"

I took a deep breath, stared at the shotgun and screwed up my resolve.

"Are you Mr. Robert Thompson."

"Was last time I looked."

I was to come to know his clipped way of speaking *very* well, although I did not even faintly suspect it at the time. To cover my nervousness I opened the attaché case and extracted the eviction papers. I had memorized the speech I was going to make and launched into it without preface.

"I am here in my official capacity as Marshal of the United Nations, Territory of Luna, empowered to perform my duties by the Secretary General of the United Nations. As the moon has been declared a United Nations Trust Territory, I

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must inform you that you are here illegally, under the terms of the Trustee Charter, signed at the Hague, 1976, and to which your country, the United States of America is a subscribing nation. The Trustee Charter limits inhabitancy of the moon, or its environs, to members of scientific or other teams, of legally recognized governments, and operating under United Nations license. No citizen of any country is allowed on United Nations Trust Territory, except as approved by the Secretary General's office of the United Nations.

"It has come to the attention of the Secretary General," I continued warming to my spiel, "that your term of duty with United States Lunar Base 3 expired twenty-three days ago—Greenwich time. You are, therefore, requested to leave the Territory of Luna as soon as possible and by no later date than departure time of the next shuttle to Earth.

"Further, you are requested to present yourself before the Security Council of the United Nations, acting in their legal capacity as high court of justice and sitting at United Nations Headquarters, New York City, New York State, of the United States of America, to answer to charges of trespassing on United Nations Trustee Territory, assault with a deadly weapon on an American citizen under United Nations protection while on United Nations Trustee Territory, and"—in spite of myself, I almost choked over the last charge—"the use of profane language over international radio carrier wave." Then I handed him the summons and prepared to run like hell.

"Quite a mouthful there," he commented, turning the summons over in his gloved hand and examining the seal of the United Nations on the flap.

"That all to it?" he asked.

"Well . . . ah . . . well, you are supposed to return to Lunar Base 3 with me. I'm supposed to handcuff you," I finished lamely.

"That could be kind of a nuisance. How big are your handcuffs?"

"I left them back at the base. I thought I had better wait until we get out of the suits and . . ." I stopped, feeling more and more foolish by the minute.

"And if I won't go . . . ?"

I drew myself up and tried to stop my teeth from chattering. The bore of that shotgun looked as big as a howitzer.

"Then I am to use the necessary means of force to return you in custody to the United Nations Security Council, acting . . ."

"Yeah, I know. I know," he interrupted. "How do you propose to go about this 'necessary force' . . . your shotgun loaded?"

"Well . . . yes . . ."

He thought a moment . . . "I suppose I could give you fair draw privileges, even though you are here, trespassing on my land."

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"Now look here, you're the one who . . ."

"Hell," he laughed quickly, "I'm not going to shoot you. They'd just send somebody else, and he might not recite speeches first. Come on inside." He stepped back for me to pass.

"Hey . . . wait a minute, I'm not going in . . ."

"Come on, nothing's going to happen except for some friendly negotiations."

The shotgun passed across my midriff—to emphasize his point I suspected, so I went. I edged into the two-man air lock and just as he started to step inside, he swore and stepped back out, his shotgun coming to his shoulder.

I stumbled after him and pushed the shotgun away. A second tractor had pulled up and was unloading men and equipment.

"Don't shoot at them," I warned, "they're representatives of the press pool at the base. If anything, you want all the sympathy you can get."

He shrugged and lowered the gun.

"You're sure they're reporters?" I nodded as best I could and he shrugged again and stepped back into the air lock. There wasn't anything else for me to do, so I followed. We cycled through and stepped into the main room. My helmet filters were set for the outside and I could not see anything until I had fumbled my helmet off. By then, Thompson had set his shotgun down and was heading across the small room towards a cupboard mounted on the rear wall. I glanced around to see a fairly neat cubbyhole, filled with odd pieces of furniture, equipment in various stages of disassembly or assembly, and what appeared to be a small assay lab.

Thompson pulled open a cupboard door. "Drink?" he asked, holding up a dirty water glass.

"I am sorry," I replied stiffly, "but I cannot drink while on . . . Drink?" Curious, I crossed the room to where he was peering into an empty—but reeking bottle.

"Nuts, empty. Come on," he said, moving toward a door next to the cupboard, "let's go find another one."

He pushed open the door, or hatch actually, that led into a storage area closed off from the rest of the dome by a partition.

Against the far wall was a chemist's nightmare—or should I say *distiller's*. I had seen equipment galore at Lunar Base 3 but most of that was neatly packaged in shining banks of cabinets. This looked more like a high-school chemistry lab gone berserk. The lower half of a large oxygen pressure tank was mounted on a tripod and surrounded by a gently glowing heater element. A shiny steel coil crowned the top of the bottle and rose almost to the ceiling before it made a ninety-degree turn to drip crystal drops

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of liquid into a plastic jug. Next to the still was a covered tank that also dripped colorless liquid into another plastic jug through a funnel. The entire room stank of alcohol and yeast. Plastic bottles, all neatly labeled, filled what little open space remained.

The rest of the room was taken up by a large cabinet, complete with the glowing dials and switches I expected. Thompson pointed to the cabinet.

"That there is a ten-man capacity algae O_2 system. Grows *Chlorella pyrenoidosa*. And it's filled with billions of the little devils, busy absorbing carbon dioxide and all kinds of simple little goodies and kicking out oxygen as a waste product."

"Yeah?" I waved my hand in the general direction of the still assembly as I marched toward it. "What is all this?"

"That," he pointed, "is making alcohol and that one is making wine. Got about five gallons out of the last batch," he stated proudly.

"They pick up every Tuesday."

"Pick up? Who?"

"Whom. The crew at the base, whom else. The Russkies even send a tractor up here once a month for a pickup."

"But, but, . . . that's illegal," I stammered.

"Says who. Show me the law. It is in the United States without a tax stamp, but not here. Didn't you just tell me the United Nations has jurisdiction up here? Far as I know, the U.N. doesn't have any laws for making booze."

I had to sit down. I literally could not believe my eyes and ears. You just don't walk into a trespasser's pressure dome on the moon and find a full scale distillery working away. You don't even find any trespassers on the moon for that matter.

"That's not all either. You're sitting on a case of blended whiskey."

"Blended whiskey," I said weakly.

"Sure, easiest thing in the world to make; when you know how. In fact, being on the moon makes it even easier. You can run your still under vacuum and boil off the alcohol even quicker."

I sat there absorbing this while he tapped one of the wine bottles and filled two glasses. "I drank up the last bottle yesterday and forgot to open another. This stuff seems to taste better once the air has got to it, so I usually let it sit for a couple of hours before I drink it."

He passed my glass over and I tasted it cautiously. It had a curious flavor, similar to lima beans, but not anywhere near as unpleasant. In fact it was quite smooth, with just a slight tang to it, more like very good Saki.

"How . . . ?" I asked after I finished the first glass.

Well," he interrupted, taking another packing case for a seat, "It's not really very hard, like I said. First off, I salvaged the oxygen sys-

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tem from Lunar Base 1 for my air supply."

"But that's stealing," I objected.

He stopped pouring. "The devil it is. Comes under international salvage law—it was abandoned, I claimed it—ergo it is now mine."

"Salvage laws don't apply here . . . I think." I stopped, puzzled. I had never really thought about it before in this context. My job was heading U.N. monitoring teams not court cases and legal theory.

"Why not?" Thompson persisted. "The laws of salvage were initiated as a part of a legal system to enable nations to settle differences on a common judicial ground. Show me where it says they have to apply strictly to oceans—or for that matter to nations. Salvage cases usually involve two individuals or one individual and a nation. If the property of one nation—or its citizens—is abandoned in international territory, then it's up for grabs by whoever can get to it first. I got to Luna 1 first after it was abandoned. You'll find my claim duly registered with both the United States and the World Court at the Hague."

He took another drink and peered closely at me. "You're not going to tell me that the moon isn't international territory, are you?"

"Noooo . . ." I said thoughtfully. He probably had registered it, too. There were so many crackpots claiming anything not nailed down, that international claims cases were backed up fifteen years.

"Good, because I'm gonna tell *you*. The moon is *not* international territory." He held up a hand. "Wait. First, let me tell you about the still."

"Well . . . O.K., but why? I'm supposed to serve the papers. That's all I'm paid to do. You can talk from now to doomsday and it won't do you any good."

He shrugged and went on. "You never know what might happen, friend." He chuckled and went on. "On my own time, during my year's tour of duty, I salvaged just about all that I could from Luna 1, using the base tractors, but paying for every bit of fuel—and rental on the tractors as well. You will find it all on the books, debited against my wages. After I got the dome up, the next thing was the algae system. I rigged it up here and cleaned it out. I bought some cultures from the base, paid for them, naturally, and got the thing going again. Since it's a ten-man system, I keep it going full capacity and get plenty of surplus growth. The surplus I dry and grind for food and grain."

"Grain?"

"Sure. Algae—especially *Chlorella pyrenoidesa*—is better than fifty per cent carbohydrates, proteins, and lipids. It not only makes a pretty nourishing food, but the carbohydrates can be broken down into sugar, and sugar makes alcohol."

"So, I just make a mash of algae and yeast"—he pointed to a cov-

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ered tray with a bank of lights—"and for wine, it ferments. Add a little sugar and it cuts some of the lima bean taste."

"Yeah, I noticed that." I was really out of my depth now. Chemistry could be pure magic for all I know about it. I was a lawyer and a psychologist and neither of those professions are particularly conducive to the scientific method. I was still curious as to why he was telling me all this, but he kept right on while I drank his liquor and tried to figure out what kind of man would want to live alone—or with anybody else for that matter—on the moon.

"After a couple of weeks I strain off the liquid and I get eighteen percent alcohol-type wine. Goes for fifteen dollars a liter at the base."

"I'll be damned," I said in surprise, looking at my empty glass.

He filled it up again. "Drink this while I explain how I make brandy, then you can try some."

"Brandy?" I asked weakly.

"Sure. Next step. All I gotta do is distill the wine, and if I'm careful, I get brandy. Not very good brandy, but brandy. For some reason, algae wine doesn't make a good brandy."

"What's that taste like?"

"Finish what you got and I'll show you."

The liquid he poured into my glass had a yellowish tinge. "Sorry about that," he apologized. "I haven't got any way to age it properly. I'm trying to figure out a way to get a couple of old sherry casks up here. That might improve the taste."

"Phfl hage! It sure isn't going to hurt it any." The stuff was as close to pure rotgut as I have ever tasted.

"Yeah, I know," he said sympathetically. "I add some burnt sugar to it. That's what gives it the yellowish color. And," he laughed, "if you think that's bad, you should taste it without the sugar."

I sniffed at the top of the glass. "Hm-m-m, once you get over the initial shock, it tastes pretty good."

"Like I said, it doesn't work so well. But it sells to the Russians for fifty rubles a liter. Those jokers will drink anything that won't kill them right away."

"Look," I said, "this is all very interesting; interesting . . . it's amazing, but why are you explaining to me?"

He filled my glass again before he answered carefully. "Loneliness more than anything else, I guess. I don't see many new faces around here anymore. Usually the tractor driver is the only one who comes out here, then just to pick up the booze. Anyway, now he's mad at me."

"Yeah. I can't blame him either. I saw the battle scars."

"Aw, shucks, I didn't mean anything personal. He came out officially to tell me to get off. I had to establish my independence some way. Besides, I gave him a free bot-

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tle and the buckshot wouldn't have hit him anyway. There's a meteor shield around that part of the tractor."

"Hm-m-m."

"Look at this though," he said with animation, hopping up to trot over to the still. "Now this stuff is real prime pelt." He opened one of the chests and produced a rubbing alcohol bottle filled with a brownish colored liquid that looked suspiciously like whiskey.

"My own blend," he said proudly, wavering slightly in the low gravity. "Distilled by Thompson Distillery, *Unincorporated.*"

He poured out half a glassful and handed it to me. Sure enough, it was real whiskey. Puzzled, I looked up.

"Rye?"

"Yep. Or close enough anyway. First I take a mash of algae, add a little sugar to help it along, and some yeast. Then I boil it in the pressure still—two atmospheres—fractionate it out. Result—pure medicinal alcohol. Some I sell to the base infirmary, some to the crew and they mix it with orange juice or Coke, and the rest I cut with rye and make a blended whiskey."

"Rye?"

"Sure. All military bases with infirmaries have rye, or sometimes bourbon in the dispensary, sometimes the old-fashioned remedies work best. Anyway, I cut the alcohol with a quarter liter of rye to one liter of alcohol and I get a blended whiskey."

Sad to say, I choked and wasted a mouthful of the liquid gold.

At that point the light dawned. "This booze is your basic trade-stuff."

"You bet. Cheers." We drank up.

"Ishn't getting close in here?" I asked. The air seemed thick enough to cut with a knife—a dull one.

"Aw, that's just the high O_2 content. I told you the algae system runs at full blast. Come on, lesh drink to the Queen."

"Whosh queen?"

"I don't care, anybodies'll do."

When we finished the first bottle, he insisted on showing me the rest of his layout. We started with the algae system, a gray boxlike structure and he lovingly explained about all the minute little plants, eating away and producing oxygen. I didn't know much about algae O_2 systems, but I did know that they had to eat.

"Sure they do. They need carbon dioxished especially."

"So, where do you get carbon dioxishd . . . dioxide?"

"Plenty around . . . whole batch of the stuff. 'Cept it's locked up in the ground. So I go and get it out."

"Yeah how?" I said a trifle belligerently.

He took me over to a louvered port and opened the blinds slightly. The sun at the left-hand edge, was low on the horizon, barely clearing the Alps away to the southwest. The rock formations threw immensely

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long shadows, causing a strangely beautiful landscape of stark white spiracles, polished by the blazing sunlight. Thompson pointed toward the sector of the sky where the Earth should have been. By shielding the side of my face with my hand, I could clearly make out the fifty-cent-piece size hole where Earth should have been.

"Midnight," Thompson commented briefly. He consulted his watch. "Keep your eye on the hole."

For a moment nothing happened, then, of a sudden, there was a faint violet flash—if you have ever seen hydrogen stripped of its electrons in an accelerator and seen the pure violet light it produces in the magnetic field, you know the color I mean.

I caught my breath. Even at a quarter of a million miles and in competition with the sun, the color was more than I could have believed. For the briefest of instants,

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the moon was bathed in an exquisite violet hue, then it was gone, fading to a silver crescent as I looked back to the Earth. The crescent grew slowly, expanding steadily, unalterably around the curve of the globe.

"Think of a better reason for staying here," he asked softly.

I realized that I had been holding my breath.

"No," I said quietly.

As I watched the crescent grow, the lunar landscape was transformed from a nightmarish hell of pure opposites to softer, more pastel hues. It began to take on a bluish-green cast, very faint at first, then filling in more swiftly as the Earth turned slowly into view.

"That's the Pacific, with dawn over the west coast of North America. The color will be a light-blue out there for a while. As it approaches noon over Central Asia, more green will show up until the surface will look like a Bonestell painting."

The earthlight increased, not competing with the sun actually, but blending until the harsh light was softened, relieving the panorama of arctic whiteness and hellish black. The Alps glowed a soft blue-green on their northern slopes, the crests of smaller ranges showing blinding white like the marching whitecaps, disappearing into the totally black depths of their stems.

Close to another twenty minutes passed before Thompson spoke again. "Now, I think you can see more clearly what I wanted to show you."

I glanced at him, suddenly angered for no apparent reason.

He ignored my expression. It wasn't until later and I had time to think about what he had murmured, that it made sense. He had said, *"It happens to us all the first and every time."*

Leaning forward, his words drew me out of my reverie. He pointed to a low hill off to the right of the dome where what looked like a radar reflector dish was pointing directly at the sun.

"That's an old parabolic dish that I hauled up from Luna 1. I replaced the maser horn with a titanium boiler and some piping to use the constant sunlight out there to run a generator rig. It produces one thousand kilowatts continuously. That gives me all the power I need and then some. When the water hits the boiler, it comes out superheated and never recondenses. All that's in those pipes is steam from round to round. The whole system works like a son-of-a-gun."

"That's your power source?" I asked incredulously.

Thompson chuckled and continued, "Why not, it's all free. Even if it gets knocked out by a meteor or something, it only takes a couple of hours to fix. The chances of one big enough to wipe out the whole works coming along are pretty nil. He

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stopped and grinned at me. He still had the bottle from the storeroom —or more properly, the distillery— and he refilled the glasses.

I shook my head in wonderment. This was just too much to believe. "You still haven't shown me where you get the chemicals to feed the algae."

"Ha. That's the easiest part. When I was in the base crew my main job was the hydroponics and algae systems—a lunar farmer you might say. I'm a microbiologist by profession with a degree in geology —or more properly selenology.

"An algae oxygen system is probably the simplest and easiest to operate. In effect it is nothing more than a miniature farm. The algae are primitive chlorophyll type aquatic plants. If any one word describes them best, it probably is *unspecialized*. They have no root system or woody stem to hold a crown of leaves, and therefore, no elaborate transport mechanisms. The process of food conversion takes place in every cell and there it stays. Algae require only CO_2 and some trace elements. The lunar soil is high in carbonates as you would expect, and all I do is heat the soil to drive out the gases, condense the CO_2 and pipe it directly into the algae tank. The trace gases that are left kill some of the plants but not enough to do any real damage. Remember, that gadget is a ten-man system and I'm only one man. The more algae killed off, the more I have to eat."

". . . And distill," I put in.

"Right," he grinned. "But the algae do need some other trace elements for foods. Mostly, these are manganates, sulfates, chlorides, et cetera. Haven't you wondered why I picked this relatively isolated hinterland. All I have to do every morning is to go out there and gather up a couple of handfuls of sand, pulverize it, and add it to the nutrient tank. When I first ran across this area I ran some complicated spectrographic and chromatographic analyses. Most of the trace micronutrients are here in one form or another and the algae is pretty good at breaking the soil down for what it needs."

"It looksh like you got everything you need here," I said thoughtfully as he refilled my glass.

Thompson grinned. "Yeah. Everything. I am totally 'shelf' supporting and I make enough of a profit from shelling booze to buy a few of the luxuries of life."

"So. But there is one thing you haven't covered. What do you eat?"

"Algae."

"Algae. Yeck. You eat that stuff?" I could feel my stomach turning over at the thought of the slimy green junk.

"Sure. Algae is a plant, it manufacturesh carbohydrates, proteins, and amino acids by photosynthesish. More than fifty per chent of the plant is pure food value which is a heck of a lot more than plants of higher orders."

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The dome seemed to be getting stuffier and stuffier all the time, but Thompson didn't seem to notice. We sat there while I tried to remember what I was supposed to do. Low oxygen pressure can be brutal when you're not used to it. Finally I remembered.

"Oh, yeah," I said. "You know you're not supposhed to be here."

"Saysh who?"

"Whom," I said wickedly.

"O.K., whom?"

"The United Nations."

"Nutsh. They don't own the moon."

"Hell they don't."

"Hell they do. The U.Sh. had prior claim. And so the Rush . . . I mean, so did the Russhians. Too many conflicting claimsh. Moon's a separate and noncontigshh, noncontigshh . . . separate planet. If Earthside nationsh have no claim, neither does U.N. U.N. gets its power from Earthshide nations. Therefore, no claim. U.N. only hash claim to anything on Earsh. Moonsh not on Earsh, no claim."

I thought furiously. Finally, I said, "Wrong, U.N. hash claim, 'cause other nations support them. They say they do, they can back it up with forcsh."

"Phooey. Who's gonna do their dirty work. No one at the bash thash for sure. I'll cut off their liquor."

"Ha! Theresh me!" I said stoutly.

"Ha yourself! Your gunsh over there," he pointed to the storeroom where my attaché case was. "And minesh right here. I'll shoot you if you go anywhere near it."

That called for some thought. "Look," I said. "I'm supposhed to tell you—fill my glass again pleash—that if you go quietly, U.N.'ll drop all charges againsht you."

"Nutsh, again. I'm sthaying."

"Whafor?"

"Like I like it here and becaushe I'm beating the shystem."

"Oh," I said brightly.

"I make a pretty good living," he continued, "pay for anything I want. Come and go ash I want. Doan pay no income taxshs. Get drunk with my fren's."

"Aw." I wiped my eyes as Thompson filled my glass again to show how good a fren' he was.

We got to singing and damning governments and I discovered a fellow anarchist. He had a sweet setup all right. He went on, proudly declaiming on how he paid for everything he got from the base, trading liquor for a few necessities that he could not manufacture yet and for some luxuries like a movie, or sugar, or coffee. He had about everything he needed. And they had said it couldn't be done, that no one individual could survive on the moon. But then they had said the same thing about going west in the covered wagons, or flying, and I suspect they said it couldn't be done to the poor slob who invented the boat. Thompson had everything he needed and that's when he broached his proposition.

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He needed a legal beagle for a partner. His biggest problem was not surviving on the moon, but being left alone long enough to do so. Unless he could prove in the courts that the U.N. had no claim to the moon whatsoever, they could throw him out anytime. The more I thought about it—powered by alcohol—the more I suspected he was right. The United Nations' claim was based on legal precedent. The trick would be to prove that the precedent was not valid in this case because the moon was extraterrestrial. The precedent was, of course, the Antarctic Treaty of some fifteen years before that made the U.N. the legal trustee for the Antarctic territory.

That treaty was promulgated to: 1) prevent the Antarctic from being used for military bases—missile bases primarily; and 2) to end conflicting claims over territory by several nations thus putting an end to the sporadic minor wars that kept popping up over who owned what; and 3) by doing so, make the territory accessible only for scientific purposes.

The treaty, giving the United Nations jurisdiction, had worked so well that by the time the question was raised in regard to the moon, it was decided to extend it in the era of international good feeling that followed the rescue of Galyvev and Punchartin in '74 by the crew at Lunar Base 2. Of course, more stringent controls had been added. And so far it had worked. No one had ever challenged the treaty's legality before, because there was no reason to. No one that is, except Thompson.

"Look," I said—it was getting harder and harder to concentrate—high O_2 can be murder when you're not used to it. "Even supposhing you are right. You're sthill an American chitizhen and subject to its lawsh. And the U.S. abidesh by the U.N. Treaty."

"Sho, show me what I am doing illegally under U.Sh. law." He paused to fill the glasses again and marshal his thoughts. "I may be an American citizhen but the U.S. still recognizesh free enterprize last time I heard, and thas wha this operation ish—a liquor dishtilling plant."

"Whoa, there," I started, "you gonna tell me . . ."

"Damned right I am," he grinned. "You've sheen it all. Exhamine the records at both Lunar Base 3 and Lenin Lunayea. You gonna find recorded purchases from Thompshen Distillers. And wha's more," he continued, "nex' week we gonna apply for international development loan from a' world bank."

"International Loan . . . hey wait jus a minute. Where you gettin' this 'we' sthuff . . . you think I gonna get mixed up with a nut lik' you in this kind nonsensh . . ."

Thompson grinned. "Les' write our constitution, fellow citizhen!"

"You drunk," I giggled. "We can

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write a consitution. Not right now."

"Wanna bet? Les' try'd and see wra happens. I'm . . . I mean we'm a new country . . . planet actuahlly. Republic of Luna—how'sh tha sound? And the United Nathions is the treshpasser, not me." His brow knitted for a moment, then he said brightly: "Even better than an international loan, we gonna leash the bashe sitesh to either United Nations or to individual countries. Make some more money, doggone."

And we did. The same constitution that's under glass at the John F. Kennedy Museum in the main dome. The shakiness of the handwriting has been attributed to everything from an excess of emotion to low gravity.

Later when we stood in front of the T.V. cameras, I was mighty grateful that I was wearing a pressure suit and that the microwave link with Earth was pretty poor. Listening to the tapes later, there was very little trace of unsteadiness in our voices. After reading off our new constitution, I ripped off the U.N. marshal's badge and flung it on the ground in full view of millions. They said the cheering could be heard almost to the Midway orbital station. I think it was the public reaction and the general human love for the underdog that won the day for us, because they never tried force to remove us and the case went immediately to the World Court. That was thirty years ago and the litigation is still dragging on.

The *Republic of Luna* we called it. Free trade and a republican form of government. Come one, Come all—as long as you want to work. The tough ones came and only the tougher ones stayed. Today the Republic of Luna, while not recognized openly, is accorded most of the diplomatic privileges of any other nation—any independent nation. Now they are talking about a Three Planets treaty with the Republic of Mars. Who knows, the United Nations finally worked pretty successfully on Earth, after its initial growing pains. Maybe a systemwide United Nations will work just as well. I say systemwide because the Woolf expedition left ten lunar days ago from our facilities. Thirty colonists are destined for Ganymede and on its return trip the expedition will drop a U.N. expedition off on Ceres. *We are moving out.*

The distillery still survives. Thompson made me an equal partner and he continued to run the *un*-incorporation until his death last month. But he changed the name to Thompson & Dillon—*the Original and Only Moonshine.* The smartest thing I ever did was to throw away that U.N. marshal's badge. ■

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The USAF Manned Orbiting Laboratory (MOL) and a modified Gemini capsule are shown in this artist's concept. The house-trailer size MOL with the modified Gemini capsule on top will be launched into a near-earth orbit by the USAF Titan III-C booster.

U.S. Air Force Photo

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Politics is not a science, whatever they may call courses in "Political Science." But today, politics so dominates major scientific research, that any scientist, to be a sane and competent scientist, must be acutely aware of Political Unscience—whether he's in electronics, nucleonics, space research or any other frontier area of science.

by Lyle R. Hamilton

one MOL step forward

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Ask any person ever associated with the Aerospace industry, what the largest, most frustrating and temper-tingling roadblock to progress is; and if he's spent as much as a day and a half on any project, he'll answer, "Paperwork."

As if the viperous volume wasn't enough, the forms have to be shuffled, routed and resubmitted. (The author, in seven years with one Aerospace titan originated only one form which sailed through without a hitch—his resignation.)

Paperwork controls an entire operation, from the early studies, through the initial RFP (Request for Proposal) all the way through to contract termination. If there's a hobble in the paperwork, the project is slated for trouble. Take DYNASOAR, an Air Force research program begun in the late 1950's, as prime example.

She was designed toward a twofold objective. To investigate vehicle operations from mach 12 to mach 18—important in itself to provide statistical data—and to fly a vaguely defined military "mission." The craft was to rocket into orbit via Titan IIIC and re-enter the atmosphere by dynamic soaring. The vessel's flat bottom side skipping on the top side of the atmosphere, bounding again into space, like a flat rock thrown onto a lake's placid surface.

The ship, after skipping to a suborbital speed, would dive into the atmosphere and fly like an airplane. The plan had certain obvious advantages. Probably the most important is that the space vehicle could be used over and over again because it wasn't overstressed on re-entry. It was anticipated that maximum G loads encountered by DYNASOAR pilots would be similar to those of conventional jet airliners.

The spacecraft never got beyond cardboard and string design. In September 1962, the public caught a glimpse of the delta winged creature, in mockup, at the Air Force Association Convention in Los Vegas. It was about 35 feet long, 8 feet high, with a 20-foot wingspan that turned upward into a rudder-like control surface. The main fuselage section was not untypical of a high speed one-man jet interceptor.

The problem with this $200 million project was that the paper work —in this case the advanced planning—was incomplete. The Titan IIIC, needed to push the estimated five to seven tons into space, wasn't hardware and the specs. on the spacecraft itself weren't tight enough to endure a change in politics.

In this nation, the scientist generally works for a Company whose existence depends on Federal contracts, either military or nonmilitary. Unless, of course, he's developing some newly improved toothpaste with green and yellow polka dots, two-toned aromatic toilet tissue or some kind of aspirinless aspirin.

The Federal contract depends

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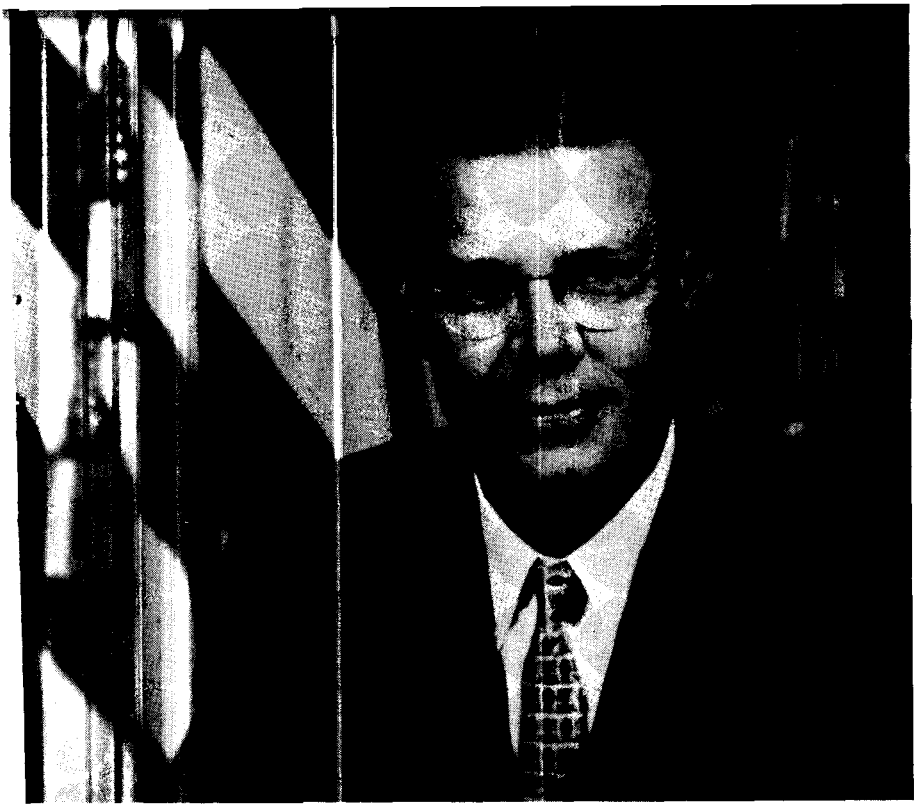

U.S. Army Photograph

Mr. Robert S. McNamara, Secretary of Defense, has created a continuing boiling pot on Capitol Hill. His opponents call him the father of the Edsel. In reality he fathered a much more successful car, during his stay with Ford, the Falcon.

either on the military needs, as envisioned by essentially nonmilitary people endowed with an extrasensory perception of congress' quantum deficit acceptance rate or the Nation's space minds' determination of the public's current goal. All depend on the whims or whimseys of Congress.

There was a word coined in 1916 by Rudolf Kjellin, a Swedish political scientist. The word, geopolitics, means the study of Geography and its relationship to a nation's internal politics.

We've progressed to a point in time when we need another phrase, machiaphysics—from Machiavelli . . . power politics—meaning the study of politics and its effect on the physical sciences. Because the government spends, through two agencies, 12 billion dollars a year in scientific research and development. This money, controlled through a system of politics, has drastic effects

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on scientific development. (The reader should mark well that more than two agencies spend R&D money. This discussion is limited to the two largest.)

NASA spends 5 billion in non-military products and the Department of Defense's Directorate of Defense Research and Engineering (DDR&E) spends 7 billion for military development.

Political forces pull, push, pinch and pucker in every direction. Pro-space pro-warfare congressmen pull for each. Pro-space anti-warfare congressmen fight DDR&E. Pro-warfare anti-space politicians fight NASA and anti-warfare anti-space congressmen glare at everyone else.

This madness is multiplied: the Army, Air Force and Navy each want their own pet projects but have to get DDR&E approval, while NASA fights to keep the military out of space. All have propaganda machines oriented to influence the public. Coordinating developments in a joint, reason from chaos committee, called the National Aeronautics and Space Council, cochaired by NASA and DOD heads.

Within NASA and DDR&E, indeed the entire Department of Defense, many little men—in the best American tradition—are scrambling to get themselves to the leader's top rung where they can teeter, fighting off the younger generation.

And somewhere—out in the midwest in an obscure shoestring company, a physicist from an equally obscure technical school has discovered something new, something important . . .

And how did we paint ourselves into this picayunish corner?

Remember, when this nation was founded and its legislative machinery put into action, it was possible for one man to be completely educated, to know everything known to mankind.

But something new was born years earlier, when Columbus set out to prove the world round. This new thing emerged full grown when the industrial revolution freed the masses from drudgery, when the sum total of man's accomplishments exceeded his ability to totally comprehend and use all the knowledge now spread like a smorgasbord upon his academic table. We then gave birth to specialists.

We've built military specialist training centers at West Point, Annapolis and Colorado Springs. Science specialist training centers in Massachusetts and California. Each state's built its own center for people to specialize in Education, Agriculture or Religion. *And each failed.*

There isn't a specialist in the

The U.S. Air Force, on September 18, 1963, successfully launched an ASSET test vehicle on a non-orbiting glide flight to gather data concerning the re-entry into the atmosphere of vehicles from space.

U.S. Air Force Photo

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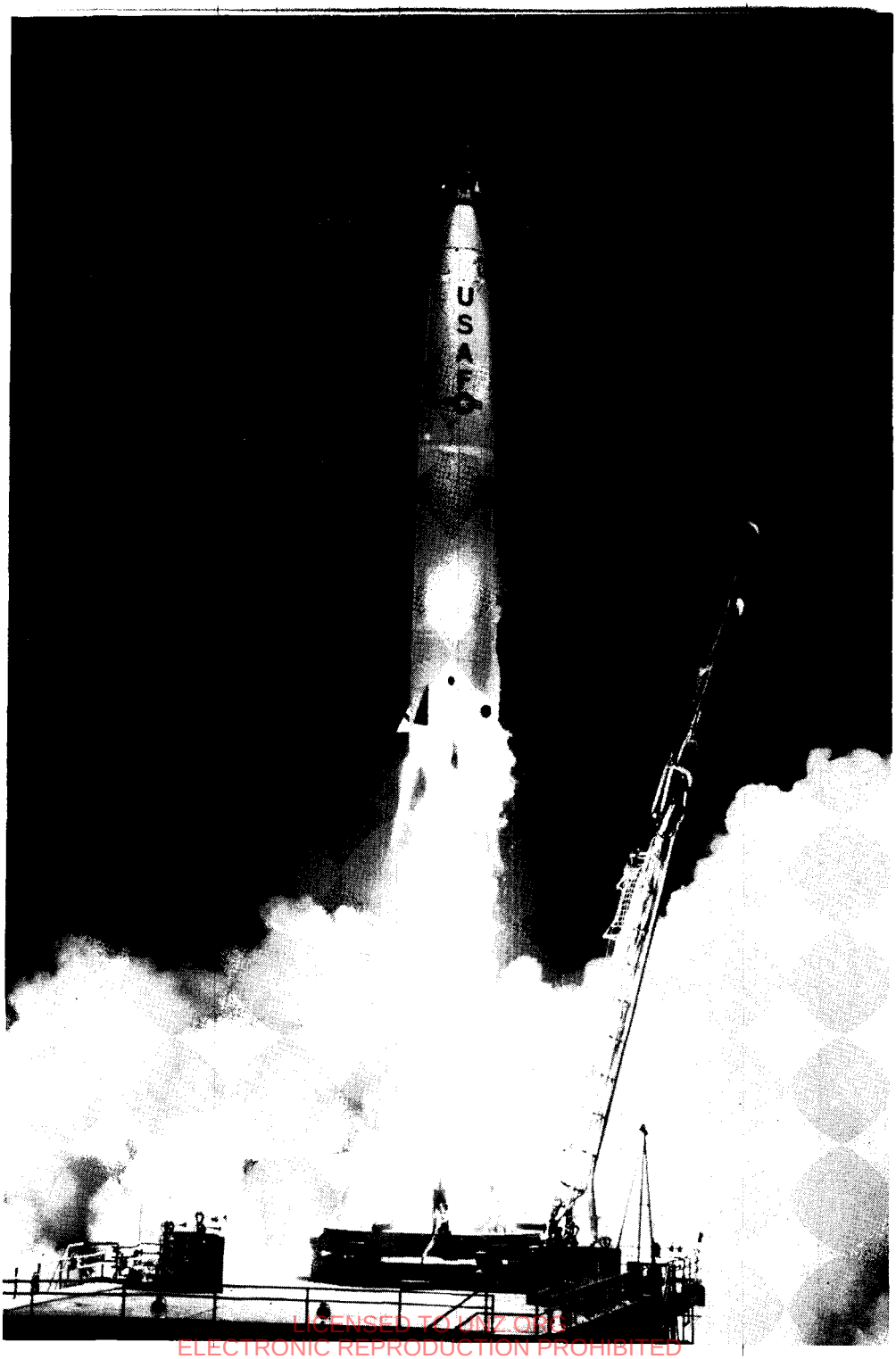

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bunch, who's all specialist. Man has refused to be molded into a single thinking being. Yet, he's been unable to grasp comprehension of the total picture as well. We have scientists who talk education, preachers who talk good agriculture and soldiers who talk pretty good religion.

Hence, some military men want to be Secretary of Defense. (Ostensibly reserved for civilians.) Some educators want to be governor or senator and some agrarians want to boss our space program.

The United States has always been cautious of military people. Even Eisenhower* indicated that they were of limited mind and cautioned, in his farewell address, not to take the military-industrial complex for granted.

Washington's first cabinet of four included a Secretary of War. John Adams, sensing a distinct difference between Army warfare and Naval warfare, added a Secretary of the Navy. In Truman's administration, the Air Force became an entity. He saw a need for unified control over the Military, and at the same time he named a Secretary of Air Force he named a Secretary of Defense. The military secretaries were taken out of the Cabinet and relegated to running their respective military branches while civilian experts were called to offer opinion of the day's military problems. (Which seems odd—one should expect fact, not opinion, from an expert.)

James R. Killian, appointed as Eisenhower's advisor, suggested a reorganization of the Department of Defense, to bring service expenditures on future weapons systems under a single eye. It seemed that weapons systems, more and more based on complex sciences, could best be developed under the scrutinous eye of men trained in science. Thus the DDR&E was born, in 1958.

Their function is to evaluate future potentials and assist the military to develop weapons systems capable of meeting them. While this may sound simple, it isn't. Just what are our future needs? That single question alone sends blood pressure skyward and shakes the most astute observer in his patent leather loafers.

The hitch is—and it's a big one—the experts don't agree.

The spectrum of reputable thought—reputable in this sense refers to educated, science oriented minds—covers all possible combinations from total disarmament to near direct aggression.

But again, because Congress controls the purse strings, these ideas are modified by the dreams and dramas of politicians. Most politicians are just that—politicians. Men skilled in getting elected and then getting re-elected.

Categorizing congressmen tends to make the following distinction.

* Was Eisenhower viewed by the American people to be a military man or just a hero?

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They are, by profession, mostly lawyers. In the House, lawyers are followed by businessmen; in the Senate the second ranking profession would be what we'd have to call professional politicians, people who've been public servants all their life. Science oriented backgrounds are few. These legislative men must pass judgment on important scientific projects despite the fact their scientific knowledge and comprehension—with few exceptions—is grossly limited. Most of them might easily be replaced by a shorted diode and a long-play record. They make up for this technical inastuteness by clinging to non-science fetishes. Among other things they are hyper-critical of cleanliness. (This problem may have its roots in the apartness that politicians must have in order to function. He isn't allowed to fraternize with industrial heads, so how can he have first-hand experience in an industrial environment?)

Space sciences—using wires, tubing, sheet metal—leave a mess. Because of the knowledge that politicians will view this mess a blundering incompetence, work areas must be cleaned up—and kept clean—during a politician's occasional brief inspection tour. (Apparently, in order to calm their own conscience, these men make tours in an attempt to get firsthand information.) This means that during the junketing voice of the people's stay, the whole operation grinds to a standstill. Men are advised to "Look busy," until the politico passes. On many occasions people have waited several hours "looking busy" until the politico passes. On many occasions people have waited an entire shift, looking busy, waiting for the purse string puller to pass, and then have him whiz through—nose in the air—at five minutes to the end of shift. The company would have been money ahead to give the men a day off with pay. (They'd have saved a fortune in power bills.)

If the politician drops in unexpected, even greater chaos develops.

During rocket development, launch complexes at the Cape are used alternately. One is fitted to the current configuration while another is modified to match the next bird.

There's a universe of sharing here; companies—assumed ruthlessly competitive—trade tools and parts. This is done on a person-to-person basis—no formal paperwork—a "You save my neck and I'll save yours," attitude. If the projects didn't work this way, America's space program would most likely still be wallowing like a Hippo in quick sand.

Complex modification is approached with vigor that would please our late President. Even engineers get their hands dirty in the major modifications. Four-foot reels of wire are pulled into the blockhouse, blueprints are strewn about and people are often short tempered.

A national politician dropped un-

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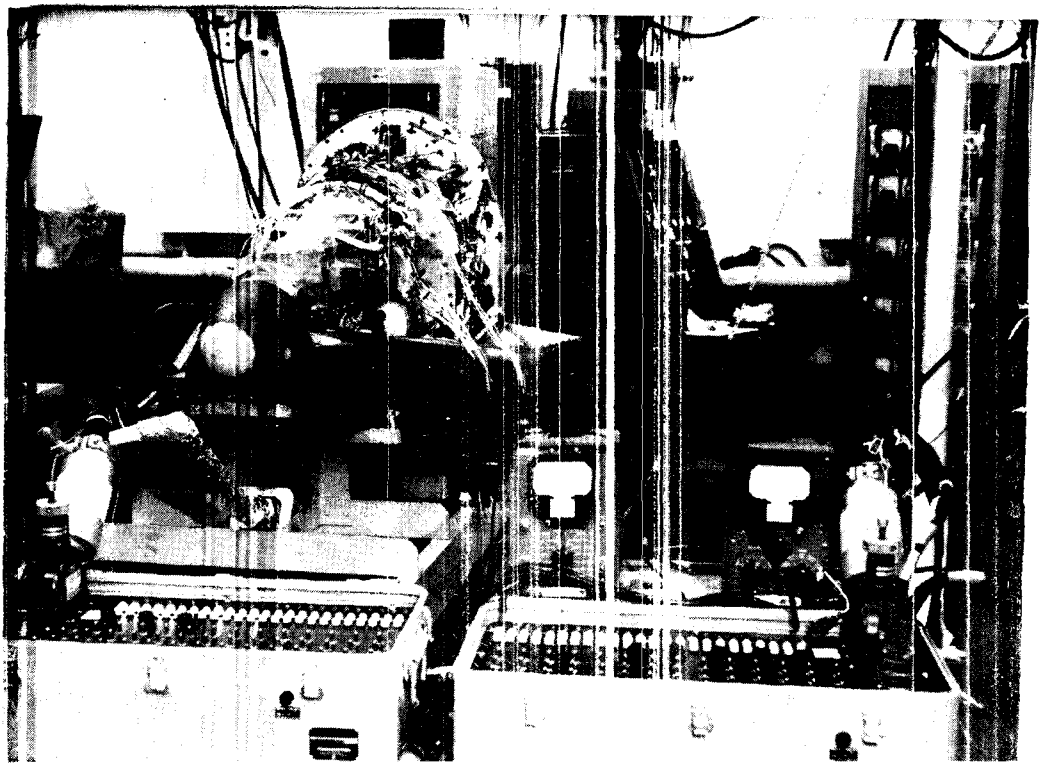

In this picture, showing ASSET checkout, we can see a resemblance between ASSET and DYNASOAR.

Opposite. Our latest example of sardine packaging? No, just a simple interior of ASSET.

expectedly into this scene. He made one comment; "This blockhouse isn't as clean as the other one," and set the complex manager into a sycophantic syndrome.

In three hours time, those borrowed tools were shipped back, the wire reels transferred into storage and the blueprints disappeared into drawers, behind desks and even into trash cans.

It took five days to recover from *that* blue pinstriped visit.

In spite of this continued political uncertainty, hanging overhead like a French guillotine, the Department of Defense has developed a philosophy toward space.

In the early parts of World War I, the airplane was used as an observation platform only. Then, one pilot shot at another with a pistol. War, which had been a ground operation was quickly taken into the sky. The Department of Defense does not want to introduce warfare into space. In fact, the United States has signed a UN agreement, with Russia, not to do so.

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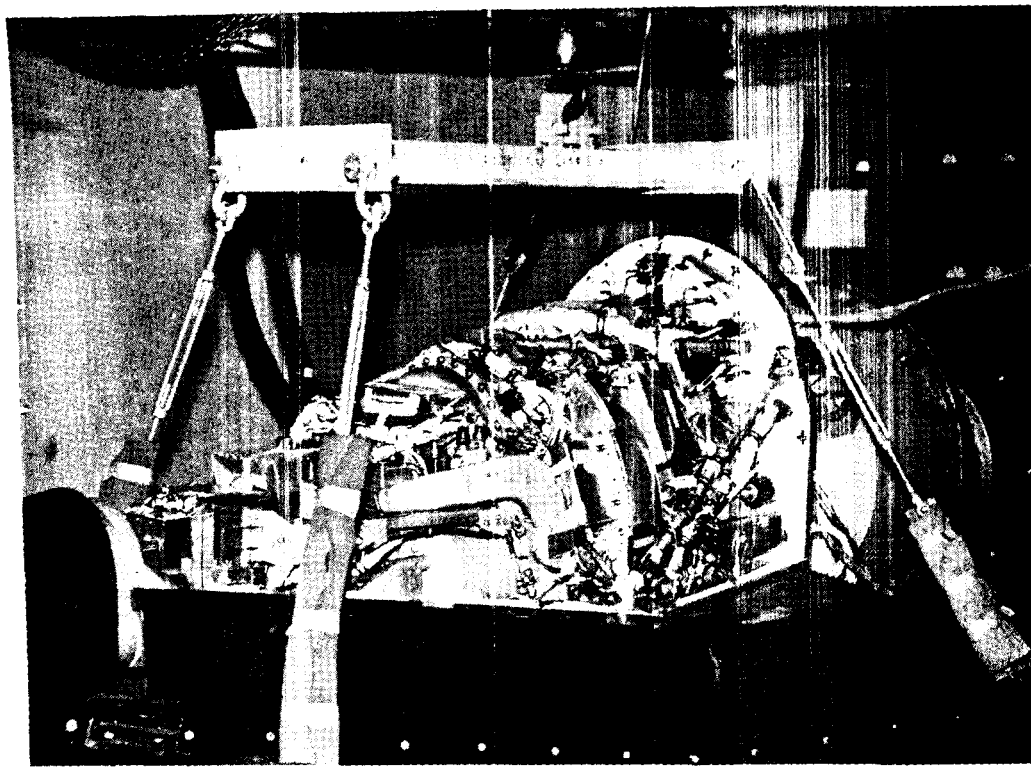

McDonnell Aircraft Corporation

However, the Air Force does not wish to totally abandon space. In March of 1963, Lieutenant General James Ferguson, AF Deputy Chief of Staff for Research and Development* told the House Committee on Science and Astronautics:

"Space is not remote. *Vostocks* have traversed the United States many times. In doing so, they passed closer to our inland cities than have any enemy craft ever before in our history, by land, or sea, or air. (This is a carefully qualified statement. Our coastal cities have no doubt been pressed by enemy ships. Perhaps the French and Indian wars utilized some interior waterways as well. His point *is* well taken, however.) No other medium provides routes for such rapid access to every part of our country as does space. This new medium is, therefore, a potential new dimension of danger and threat which we cannot afford to ignore.

"It is axiomatic that we will learn the military meaning of space in one of two ways: either through exploring the military potentials of space ourselves or by observing demonstrations made by our enemies. In the latter case, it would be too late

* It's obvious that the military establishment is more complicated than this article's scope. The Air Force fully researches each proposal, overseen, by the DDR&E. The DDR&E advises and approves.

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to make use of our dangerously acquired understanding.

"History records that an acceptable peace in any medium has been maintained only through the existence of ready military strength applicable to that medium. Unfortunately, it also records that every medium affording military possibilities has been used for military purposes."

Military roles are usually short sighted, built for one purpose. Like a rifle, its single function is to kill. The same month, Assistant Defense Secretary John H. Rubel told the Pentagon (Rubel is technically astute, BSEE from Cal. Tech. He's been in top level engineering with Lockheed and Hughes, to name just two aerospace giants he served.): "The rate at which government support of research and development has increased in recent years cannot go on forever."

He then developed his theme, "It is obvious that a vast segment of industry does not share directly and probably shares very little even indirectly in the techniques and the approach to problems which have stemmed and are stemming from the military space programs that account for the bulk of federally supported research and development.

"It is clear, also that these R&D expenditures often serve comparatively narrow purposes. They may be, and hopefully in all important cases they are, necessary purposes. But, although necessary, they may, from a national standpoint, be more costly than we have tended to realize. The purposeful broadening of the objectives that are served by federally supported research and development activities would appear to be clearly in the national interest, and certainly in the national security interest."

To crudely paraphrase, "Can't we get more for our buck?"

Thus DYNASOAR was out. In spite of Air Force efforts to broaden its designed-in limitations.

A press release by the Department of Defense, dated December 10, 1963, marked the creature's demise:

"Secretary of Defense Robert S. McNamara today assigned to the Air Force, a new program for the development of the near earth Manned Orbital Laboratory.

"In initiating the MOL program, it was decided to terminate the DYNASOAR (X20) program because the current requirements call is for a program aimed directly at the basic question of man's utility in space, rather than a program limited to finding means to control the return of a man from space. The DYNASOAR was designed to do the latter."

Clearly, the DOD ax had discovered the law of gravity. As it was to do, again and again, in different ways, to squeeze as much action out of the taxpayer's dollar as possible. This approach has brought Secre-

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tary McNamara a load of comment.

One of his unfavorable commentators, a Congressman Bray, has been extremely prolific in abuse. McNamara has, however, withstood the blows like a four-masted China Clipper in a trade wind. Author William W. Kaufman, in his book "The McNamara Strategy," published by Harper & Row, explains (Italics added):

"Congressman Bray may not have represented the majority of McNamara's Congressional interlocutors, but he reflected a concern and an uneasiness which gradually mounted in the Congress as the defense program unfolded. Part of the uneasiness no doubt stemmed from the *past nature* of the relationship between Congress and the Department of Defense. *Owing to the divisions and rivalries within the Department, Congress had formerly played the Services off against one another, influenced policies, and affected the magnitude and direction of defense expenditures in a variety of ways.* Now, with McNamara exercising central control over the Department, commanding an enormous fund of knowledge and presenting a carefully integrated defense program, these activities had become substantially more difficult. Even though relations with the Services remained close and a number of senators and representatives retained Reserve Commissions and dedicated themselves to the pursuit of the interest of the Services with which they were associated, the room for maneuver and bargaining had declined."

But what about DYNASOAR's other objective? The one left out of McNamara's press release? The one to investigate mach 12 to 18.

The Air Force, early in 1963, disclosed another project, developed by the Air Force Flight Dynamics Laboratory at Wright Patterson AFB, Ohio and the Research and Technology Division at Bolling AFB, Washington D.C. It was built by McDonnell Aircraft to test material and design for more accurate development of post DYNASOAR hypersonic aircraft and advanced re-entry vehicles.

The story of McDonnell Aircraft is a story of a single bold man. Its founder J. S. McDonnell, known affectionately as Mr. Mac, is one of those unique, rare individuals who from time to time grace our society. The forerunner to McDonnell Aircraft was known as McDonnell and Associates. It was the year 1928 and they designed and built a small monoplane to enter in the Guggenheim Safe Aircraft Competition. Mr. Mac flew it to Mitchell Field, Long Island for the competition. He landed in the approaching darkness, equipped with flashlights, painted green and red, taped to the wing tips.

The next day, during the competition, Mr. Mac was doing aerobatics when the horizontal stabilizer folded up. A timid soul would have

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bailed out, but he bravely rode his creation to the ground, engine conked out and controls jammed.

From this venture he went to work for Glenn L. Martin Company. He quit his position as chief project engineer for landplanes in 1939 and founded the Company he now heads.

The Air Force project, called ASSET (Aerothermodynamic/Elastic Structural System Environmental Tests) would provide ninety-five per cent of the information available from DYNASOAR at a trifling $13 million price tag. In addition ASSET could not be considered a weapons-system prototype. (It vaguely resembled DYNASOAR in shape.)

The program called for four Aerothermodynamic vehicles, designed to investigate structural concepts and obtain data on materials, coatings, surface temperatures and pressure distribution. Two Aerothermoelastic vehicles would provide data on thermal effects on structural response and aeroelastic instabilities. The vehicles were 68 inches long with a 58 inch wing span. The aerothermoelastic model at 1,200 pounds outweighed its brother by a hundredweight. The nose caps, leading edges and lower test shield were made of refractory ceramics and materials, including columbium, molybdenum, titanium and beryllium. The structures used superalloys and the floors were titanium.

Project ASSET indeed proved an asset. According to McDonnell Aircraft the ASSET concept of high yield—short time—low cost programming marked an essential step in the acceleration of progress into military space.

But ASSET wasn't going to be McDonnell's only contribution to this evolving drama. The DOD indicated, in the December announcement, that a modified GEMINI, also manufactured by McDonnell, would be attached to the MOL as a return vehicle.

In early 1964, Dr. Harold Brown, then Director DDR&E, testified before the House Armed Services Research and Development subcommittee. He described the MOL as it was then envisioned. "I want to make a distinction between its ultimate capability," he said, "and what is in the program. What is in the program is not a space station in that sense. It is an experimental laboratory. But . . . this could grow to be a space station, if and after we conclude that a man can have a substantial military purpose."

The program would be nonmilitary, to please the antimilitary space factions, with military potentials to please the pro-military space people. Douglas, GE and Martin were awarded Orbiting Space Station (OSS) contracts to study the idea.

The craft was then estimated to be:

1. A cylinder about 10 feet in diameter and 25 feet long, weighing over 10,000 pounds.

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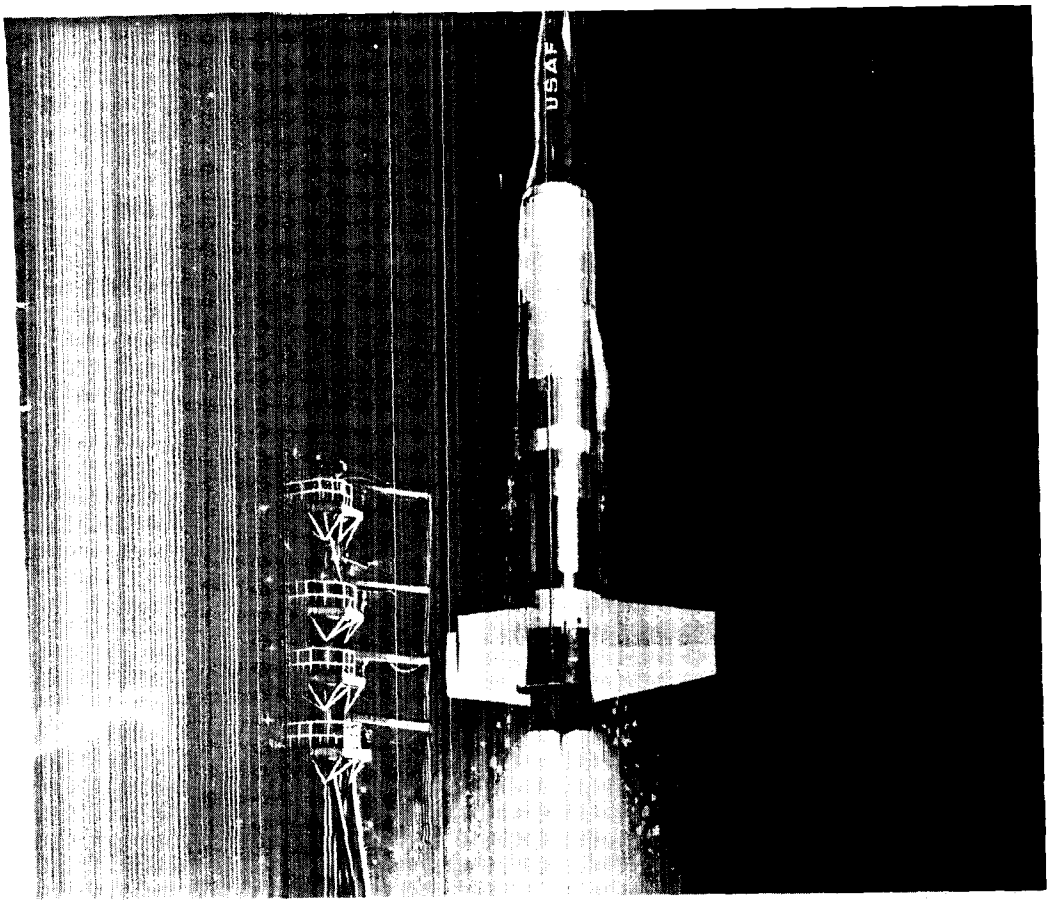

U.S. Air Force Photo

An artist's rendering of the flight of a U.S. Air Force DYNASOAR. A specially adapted TITAN II intercontinental ballistic missile boosts the DYNASOAR glider toward space.

2. Double walled to provide protection against meteorites and divided into two pressurized compartments in case one compartment was punctured.

3. A third unpressurized compartment would be set aside for testing components under space vacuum.

4. Stay time of 30 days.

The program had a long way to go. When totally defined it would have to meet McNamara's critical eye as well as NASA's. Concepts of orbiting laboratories had been brewing for years. The ideas were fairly simple, an orbiting platform of some kind large enough for men to move around and do work of some type, plus a shuttle service from earth.

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In this manner, shuttling back and forth, several men could be kept in space for long periods at a relative low cost.

Almost immediately the in-house bickering began; NASA chunked a few selected rooks at MOL. They complained that a 30-day stay time wasn't long enough to evaluate zero G effects for extended missions—like Mars or Venus—and that the Titan IIIC payload was already getting marginal.

The nonmilitary agency continued pointing out that a two-man crew wasn't large enough to give a statistical base for long term capabilities because effects may vary from man to man.

It was clear, NASA was pushing for a NASA space station with four to six men and a four-month mission time.

The Air Force countered the attack showing that MOL's could be stacked up—in orbit—to provide any arrangement and as many men in space as was necessary. The projected launch cost, $50 million a shot for GEMINI, MOL and IIIC was considerably cheaper than a $200 million launch for heavier platforms.

The price tag made NASA change their tune, they stopped talking about new laboratories and began unveiling plans showing how the APOLLO X system, using existing planned hardware, could be used as an orbiting research platform. And at the same time, the OSS studies were having difficulties defining the scope of MOL. Competent viewers began predicting MOL's doom, while the Air Force claimed they were just being cautious in planning their objectives.

In December of '64, the decision to go ahead was still waiting. Some experts, claiming that MOL and APOLLO X were duplicate efforts, despite an unexpected November comment by NASA's George E. Mueller that, "we need them both," were recommending that MOL be dropped.

Late in the month officials indicated MOL had the go ahead and that a joint DOD/NASA press release would be out in early 1965. The release, dated January 25th, is interesting in that it begins to clearly define the difference between DOD in space and NASA in space. One must pause and wonder if pressure weren't applied somewhere to stop the belly-aching and get on with the project.

"The Secretary of Defense has made several decisions with regard to the manned orbiting laboratory program as a result of the intensive studies carried out by the Air Force during the last year. The Administrator of NASA has made related decisions on extensions to the Apollo program. Together, these decisions represent a unified approach to a national program of research and

Artist's concept . . . U.S. Air Force's X-20 spacecraft DYNA-SOAR as it will look in orbit.

U.S. Air Force Photo

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McDonnell Aircraft Corporation

The legendary Mr. McDonnell. He has uncommon ability to put together an industrial team.

development on manned earth orbital flight. The decisions of both agencies are reflected in the 1966 budget.

"The policy framework for these decisions is:

1. The DOD will actively continue to explore potential applications of manned space flight to national security requirements.

2. The NASA manned lunar landing program as now approved will continue to have top priority.

3. Duplicative programs will be avoided and manned space flight undertaken in the years immediately ahead by either DOD or NASA will utilize spacecraft, launch vehicles, and facilities already available or now under active development to the maximum degree possible.

4. Full-scale development of manned space-flight systems beyond the currently approved GEMINI and APOLLO will be carried out only when the experiments or missions to be undertaken have been adequately defined and their value is justified in relation to the total cost.

"The related programs of the two agencies will be carried out as follows:

1. The Defense manned orbiting laboratory program will be oriented to the primary objectives of:

a. Development of technology to improve capabilities for manned or unmanned operations of military significance. This may include intermediate steps toward operational systems.

b. Development and demonstration of manned assembly and service of large structures in orbit with potential military applications.

c. Experiments directed to the quantitative determination of man's military usefulness in space.

2. Planning for the Defense manned orbiting laboratory program will also consider, in co-operation with NASA, broader objectives

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of scientific and general technological significance.

3. To determine the essential characteristics of the vehicle that will be required, the DOD will continue intensive studies and design of experiments and systems aimed at the primary military objectives.

4. Co-operative studies, by NASA and Defense, will identify and define scientific and general technological experiments which might be carried out, with NASA participation, in conjunction with the military program.

5. DOD, with assistance from NASA, will compare configurations of APOLLO which may be suitable for military experiments with the GEMINI B—MOL configuration to determine the complete system that can meet the primary military objectives in a more efficient, less costly, or more timely fashion."

The release indicated two interesting points. There was now indecision whether to use GEMINI or APOLLO as the recovery vehicle and that the contractor had yet to be chosen.

In April of 1965, the House Committee on Science and Astronautics drafted a letter to President Johnson asking him to come to a decision. The letter indicated their concern that with GEMINI 12 entering assembly, the GEMINI industrial team would be broken up. This could create serious problems if GEMINI were chosen over APOLLO.

Johnson didn't answer until August 25, 1965, incidently, coinciding with the announcement that Astronauts Cooper and Conrad were able to make photographs from GEMINI 5.

Douglas Aircraft was named contractor, with GE planning the experiments. GEMINI was to be used as a ferry vehicle. A noon briefing at the Pentagon provided details.

The DOD spokesman stated clearly that MOL would not be a bomb carrier and that just because it was a military program didn't mean it was aggressive. A point to satisfy many factions. He added that one reason for the DOD program was that NASA projects had little room for man to do anything particularly useful from the military viewpoint. The Astronauts mostly, "just sit there."

The MOL itself will be about 41 feet long and divided into two compartments, one pressurized and one unpressurized. Longer than originally thought with one less compartment. The combined GEMINI-MOL weight will be 25,000 pounds.

The representative was asked why APOLLO was abandoned.

"Well," he said, "I don't think we ever abandoned it."

"You studied it."

"We studied it."

"Why did you go with GEMINI?"

"The APOLLO has capabilities which are considerably in many respects beyond what we need for this

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particular program. I think the best example of that is the re-entry characteristics. The APOLLO must be able to re-enter the atmosphere safely at super-orbital speed, and, therefore, its design was directly headed for the APOLLO mission. Upon close examination, the Air Force concluded that the cost of the program that we have here will be less by using the GEMINI than by using the APOLLO type of vehicle because of these extra capabilities we've put in.

"However, the program will include very considerable of the technology which has been developed in many of the subsystems which have been developed by the APOLLO as well as the GEMINI program."

The spokesman noted that while shuttle service was obviously available, it wouldn't be used on the first phases of the program. If, for some reason, the platforms were used beyond 1970, shuttling might be part of the program.

The Air Force's use of the laboratory is interesting. Among other things, they plan the construction of an antenna about 100 feet in diameter. (Assumed to be a parabolic reflector.)

Quizzed on why the program was a year late in definition, the DOD official retorted in a way which indicates the DOD's new look, "I wouldn't say we lost anything; we may well have gained several years, as a matter of fact, by the careful consideration we've given it."

The NASA-DOD conflict, clearly observed by the press, was probed by one carefully prepared newsman. He asked if the Air Force version of MOL was superior in all respects to the NASA proposal. Particularly after NASA's strong insistence that they could provide the DOD, in a NASA program, with information toward defining the military capabilities.

He was answered, "The plan presented is the Air Force plan. It was recommended by the Air Force. The Air Force, in carrying out the studies and selection of what they wanted to do, considered all kinds of equipment which were available. That included Titan IIIC, GEMINI, APOLLO, versions of APOLLO. NASA worked very carefully and very helpfully with the Air Force in carrying out these studies. The decision, recommendation to the Department of Defense was made on the basis of cost and timeliness. The general decision that was made by the Secretary of Defense was then, in coordination with the Space Council which includes the Administrator of NASA. And in *effect* it is concurred in by NASA.

We must assume that the enemy will follow suit. There may come a time when our MOL will face their MOL. Perhaps, one will attack the other with an Oxyacetylene cutting torch. If man *must* war, wouldn't those bombs, going off in outer space, create *less* damage? ■

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PSYCHOCERAMIC

☐ This is NOT a "Special Feature"; the data given is perfectly correct —as a look at the American Chemical Society publication "Fuel Cell Systems", available in any university or major city library will assure you. It just sounds crackpot!

JOHN W. CAMPBELL

"Doc" Timothy Mulrooney was already launched into his persuasive sales proposition, when Carson got to the meeting, and sat down quietly at the back. Mulrooney was a powerfully built man, with a seamed and weather-beaten face, a look of authority and sincerity, and a strong, pleasant voice. He appeared to be about fifty-five or so.

He was holding up a two-inch disc of a brilliantly white ceramic material, and explaining earnestly that "This is the basic discovery that makes possible the new industrial oxygen device I'm seeking to interest you gentlemen in. This is a disc of the ceramic we've discovered—the Yttrizirc Oxyfilter, we're calling it." He put down the disc, and held up a short length of equally white, thin-walled ceramic tube. "Like any ceramic, it can be produced in a variety of shapes very cheaply. A slightly modified formulation—we call this one Zircal Oxyfilter"—he held up a second seemingly identical tube—"is almost equally effective, and slightly cheaper. A tube like this costs about three hundredths of a cent to produce in quantity.

"The major investment in the system is not these ceramic tubes, nor even the platinum coating that is applied inside and out for electrical contact, but the auxiliary equipment needed to make the system work—the furnace, pumps, and electrical equipment.

"Now the remarkable thing about this Yttrizirc Oxyfilter ceramic is that while it is a completely impervious ceramic, when heated to about 1000°—a bright red heat—oxygen passes through the material freely, while nothing else can. Moreover, if we apply these porous platinum electrodes—they're sprayed on with an oxy-acetylene torch of special design—the oxygen in passing through the yttrizirc—or the zircal—ceramic, generates electric power. There's some resistance to the passage of the current through the ceramic—about three tenths of an ohm in a tube like this one—so that when we have a com-

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plete oxygen plant set up, this electric current passage generates some heat in the tubes.

"Most of the current, however, will be available outside the furnace for supplying power to our pumps.

"Here's the basic system: Air enters through a heat-exchanger, where the hot, waste gas from the furnace pre-heats it, and we recover the heat in the exhaust gas. It passes into the furnace, where the oxygen is stripped off through the yttrizirc filters, and exits through the tubes to the vacuum pumps—first passing through the heat-exchanger, where it gives up its heat to some of the entering air.

"As long as the pumps maintain a low pressure in the inside of the yttrizirc filters, oxygen flows through the ceramic, but nothing else can. The pumps will be largely operated by the electric power from the platinum electrodes on the inner and outer sides of the filter tubes. We'll have to supply some power for the pumps, and heat to maintain the furnace at the required temperature—but we'll have a steady supply of pure oxygen directly filtered from the air by this remarkable ceramic material. The costs are considerably less, overall, than the complex air-liquefaction methods currently used."

Carson, in the rear, had been busy making notes during "Doc" Mulrooney's little speech. At this point, he stood up, and asked, "Eh . . . Dr. Mulrooney, doesn't that stuff melt if you keep it in that furnace?"

"Doc" smiled slightly and shook his head firmly. "No—it definitely doesn't. The lowest melting component of the system is the platinum, and that takes almost twice the 1000° temperature to melt."

Carson smiled triumphantly, braced himself on his feet solidly, and said, "Then, *Doctor* Mulrooney, I say you're a liar, a fraud, and I can prove it by your own statements!"

Mulrooney looked startled, bewildered, and suddenly weary. "Oh, Lord . . . here we go again. O.K., son, let's have it, and we'll set you straight. First—who are you?"

"I'm John Carson, in charge of the science department in the high schools here in town. One of my friends told me about your private little lecture—to which I was not invited, by the way—and I was strongly suspicious from what I heard. Tell me, *Doctor* Mulrooney, where did you take your post-graduate work?"

Mulrooney grinned. "The doctorate was an honorary degree, conferred by my friends and co-workers in the University of Hard Knocks. I never got to college somehow. Seems my Dad died when I was eighteen, and left me with the family ceramics plant to run—which I've been doing since.

"But the fact all my friends call me 'Doc' isn't important. I'm real

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anxious to hear this proof I'm a fraud. Let's get on with it."

"Very well—you've just told me flatly that no component of that ceramic is molten at the temperature used—and *where* did you get those weirdo names for the stuff? *Yttrizirc* and *Zircal,* no less! I must grant you great imagination—but if no component of the stuff is molten, and it is a crystalline ceramic, then you *can't* get current through it! Three-tenths of an ohm? It'd have a resistance in the millions of ohms! Anyone with a home electric room heater has seen ceramic tubes running red hot, and *not* conducting current, but acting as very fine insulators.

"Moreover, you claim that stuff will 'filter out' oxygen from the air. *But* you said it was an 'impervious' ceramic? Which way do you want it —pervious, so it can act as a filter, or impervious, so it doesn't pass gases?

"What you've been giving us is the damndest mess of fancy double-talk—and self-contradictory double-talk at that—I've ever heard!

"And look—if it were a filtering ceramic, nitrogen molecules (being lighter than oxygen molecules) would work their way through faster—like the U-235 molecules being separated from heavier U-238 at Oak Ridge—so that the output gas would have *less* concentration of oxygen, not more!

"There isn't one self-consistent, logical statement you've made.

"And the topper—saying that two identical electrodes insulated by a high-temperature ceramic, will actually generate electric power . . . ! Perpetual motion we've got it, maybe? Where is that electric power coming from? You haven't got an electrolyte, you've got an insulator. You've got two identical electrodes, both inert metal.

"Oh, look gentlemen," Carson turned to the audience of local businessmen, "isn't that evidence enough this fraud's trying to get some of your cash converted into that highly portable platinum he's talking about, and 'port' off with it?"

Mulrooney remained leaning gently forward, his hands spread on the tabletop, smiling easily. "Through, son? Trouble with you teacher-fellas is that you get busy keeping up with the educational journals, and the students' marks, and don't know what's goin' on in the world. Too bad. Guess your science courses quit about fifteen years or so ago, huh?

"Well . . . let's see. Ever hear of Yttrium and Zirconium metals? Yup . . . now you get it. Yttrizirc yttrium-zirconium oxides. Roughly 10% yttrium and 90% zirconium oxides, with some little additions of other spices—that's my own contribution to this cookie." He held up the brilliantly white disc.

"I know it sounds crazy—privately we've been calling this stuff 'psychoceramic'—it's the crackpot-

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est ceramic that ever came along. The Zircal mix is basically 15% calcium oxide and 85% zirconium oxide. And that's not my secret—Westinghouse Electric took out the patents on it back in about 1960, I think it was.

"Your courses didn't deal much with fuel cells, so I guess they forgot to tell you about that—and you haven't kept up with the world since.

"Either the zircal or yttrizirc ceramics will, at about 1000°C. go into an equilibrium reaction of some kind with free oxygen, such that free oxygen and the oxygen in the zirconium and yttrium or calcium oxides is completely mobile. The result is a solid electrolyte; it conducts electricity very readily—by passing oxygen ions through the crystal lattice. Sort of like the holes passing along through a transistor p-type material.

"Now you see we *do* have our electrolyte, without having to have a liquid at all. No molten salts needed.

"Next, you want to know how we can have a current generated with two identical electrodes. Simple, son—it's a concentration cell! On the outside of the tube, we've got oxygen at about .2 atmospheres pressure; on the inside we're pulling the concentration down with our pumping. Result—a difference of concentration that causes a flow of oxygen through the electrolyte. Oxygen molecules go in on the outer surface, acquire four electrons and become a couple of oxygen ions. These pass through the electrolyte, shed the electrons at the inner electrode here, and leave as oxygen molecules under low pressure.

"And the energy that bothered you? It's not perpetual motion; the energy supply for a concentration cell is whatever force maintains the difference in concentration—in this case, our pumps.

"In the original Westinghouse fuel cells, they kept the concentration down low on the inside by the simple process of burning the oxygen."

We can leave that imaginary interview—its principal point was to bring out the thoroughly improbable characteristics of the Westinghouse development of zirconia-yttria and zirconia-calcium oxide solid electrolyte ceramic.

The facts are as stated. A slab of that dense, impervious ceramic, between two porous platinum electrodes, heated to about 1000°, with air on one side, and a no-free-oxygen environment on the other, passes oxygen freely, but nothing else. It has a resistance-to-electricity of about 0.3 ohms—which is, itself, a wildly improbable fact! The stuff doesn't even soften at a temperature that makes alumina—one of the standard high-temperature refractories—run off in liquid streams. Zirconia melts just under the *boiling* point of aluminum oxide! The *lowest* melting component

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of this remarkable electrolyte is yttria—Y_2O_3—with a melting point of 2410°C.

The early work done at Westinghouse used the ZrO_2-Y_2O_3 ceramic, with platinum electrodes, with cells made as small tubes, with a diameter and a length of approximately one centimeter. The platinum sprayed electrodes are so thin that the total weight of each unit cell is about 2.0 grams. But at maximum power output, they produce 160 watts per pound of cell! Each of the 1 x 1 cm. unit cells can produce *continuously* as much power as a standard flashlight battery.

The early work was done with hydrogen as the fuel to consume the oxygen on the inside of the tube; for laboratory experimental work, that made an easy system to work with. With hydrogen and air, the cells produce 1.15 volts on open circuit. Maximum power output was obtained at about 1.5 amperes and 0.85 volts per cell, about 150 amperes per square foot of cell.

Analytical calculations, and some data-gathering experiments, showed that the cells worked just as well on carbon-monoxide-hydrogen mixtures and air, and that a no-moving-parts power plant, burning coke and water and air, could be made and operated. The chemical end of it involves the reaction of water and hot carbon:

$$C + H_2O = CO + H_2$$
$$2H_2 + O_2 = 2H_2O$$
$$2CO + O_2 = 2CO_2$$

The CO and H_2 producing reaction would be carried out in one reactor unit, and the oxygen-consuming reactions would be in the zirconia cells. The overall efficiency of this way of burning coal to yield electric power is between 60% and 70%—and present-day high-efficiency power plants achieve a maximum of 42%!

The hypothetical "Doc" Mulrooney's figures on costs are valid—the Westinghouse cells had a materials cost of 0.004 cents for zirconia and 0.03 cents for platinum.

Westinghouse hasn't investigated the subject very far, so far as I know, but considering the chemical inertness, and general ruggedness of this zirconia-platinum setup, it would seem that *anything* that would consume oxygen efficiently would serve to make the cells work. Gasoline—charcoal—wood alcohol—any darn stuff you could get an effective oxygen-consuming vapor from. Ought to make a real handy type of back-country power plant! If something cruds up the inside of the tubes a bit, I imagine one could run the furnace up another 500° or so, and cook it out. There aren't many things that'll stay around long at 1500°C. in an oxidizing environment; platinum and zirconium-yttrium-calcium oxides definitely excepted.

Westinghouse hasn't, so far as I know, investigated the other aspect of the stuff—a filter for producing commercial oxygen. ■

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Kelly Freas

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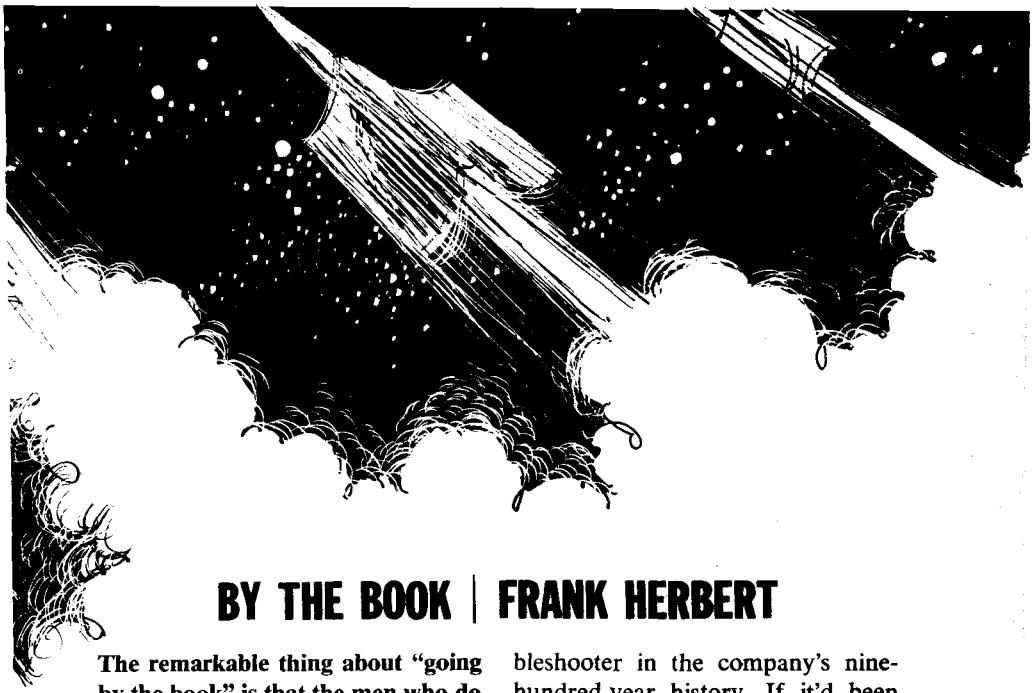

BY THE BOOK | FRANK HERBERT

The remarkable thing about "going by the book" is that the men who do so with great creative originality deeply and honestly believe they're doing just what the book says!

You will take your work seriously. Infinite numbers of yet-unborn humankind depend upon you who keep open the communications lines through negative space. Let the angle-transmission networks fail and Man will fail.

"You and the Haigh Company"
(Employees Handbook)

He was too old for this kind of work even if his name was Ivar Norris Gump, admittedly the best troubleshooter in the company's nine-hundred-year history. If it'd been anyone but his old friend Poss Washington calling for help, there'd have been a polite refusal signed "Ing." Semi-retirement gave a troubleshooter the right to turn down dangerous assignments.

Now, after three hours on duty in a full vac suit within a Skoarnoff tube's blank darkness, Ing ached with tiredness. It impaired his mental clarity and his ability to survive and he knew it.

You will take your work seriously at all times, he thought. *Axiom: A troubleshooter shall not get into trouble.*

Ing shook his head at the hand-

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book's educated ignorance, took a deep breath and tried to relax. Right now he should be back home on Mars, his only concerns the routine maintenance of the Phobos Relay and an occasional lecture to new 'shooters.

Damn that Poss, he thought.

The big trouble was in here, though—in the tube, and six good men had died trying to find it. They were six men he had helped train—and that was another reason he had come. They were all caught up in the same dream.

Around Ing stretched an airless tubular cave twelve kilometers long, two kilometers diameter. It was a lightless hole carved through lava rock beneath the moon's Mare Nectaris. Here was the home of the "Beam"—the beautiful, deadly, vitally *serious* beam, a tamed violence which suddenly had become balky.

Ing thought of all the history which had gone into this tube. Some nine hundred years ago the Seeding Compact had been signed. In addition to its Solar System Communications duties, the Haigh Company had taken over then the sending out of small containers, their size severely limited by the mass an angtrans pulse could push. Each container held twenty female rabbits. In the rabbit uteri, dormant, their metabolism almost at a standstill, lay two hundred human embryos nestled with embryos of cattle, all the domestic stock needed to start a new human economy. With the rabbits went plant seeds, insect eggs and design tapes for tools.

The containers were rigged to fold out on a planet's surface to provide a shielded living area. There the embryos would be machine-transferred into inflatable gestation vats, brought to full term, cared for and educated by mechanicals until the human *seed* could fend for itself.

Each container had been pushed to trans-light speed by angtrans pulses—"Like pumping a common garden swing," said the popular literature. The life mechanism was controlled by signals transmitted through the "Beam" whose tiny impulses went "around the corner" to bridge in milliseconds distances which took matter centuries to traverse.

Ing glanced up at the miniature beam sealed behind its quartz window in his suit. There was the hope and the frustration. If they could only put a little beam such as that in each container, the big beam could home on it. But under that harsh bombardment, beam anodes lasted no longer than a month. They made-do with reflection plates on the containers, then, with beam-bounce and programmed approximations. And somewhere the programmed approximations were breaking down.

Now, with the first Seeding Compact vessel about to land on Theta Apus IV, with mankind's interest raised to fever pitch—beam contact had turned unreliable. The farther

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out the container, the worse the contact.

Ing could feel himself being drawn toward that frail cargo out there. His instincts were in communion with those containers which would drift into limbo unless the beam was brought under control. The embryos would surely die eventually and the dream would die with them.

Much of humanity feared the containers had fallen into the hands of alien life, that the human embryos were being taken over by something *out there*. Panic ruled in some quarters and there were shouts that the SC containers betrayed enough human secrets to make the entire race vulnerable.

To Ing and the six before him, the locus of the problem seemed obvious. It lay in here and in the anomaly math newly derived to explain how the beam might be deflected from the containers. What to do about that appeared equally obvious. But six men had died following that obvious course. They had died here in this utter blackness.

Sometimes it helped to quote the book.

Often you didn't know what you hunted here—a bit of stray radiation perhaps, a few cosmic rays that had penetrated a weak spot in the force-baffle shielding, a dust leak caused by a moonquake, or a touch of heat, a hot spot coming up from the depths. The big beam wouldn't tolerate much interference. Put a pinhead flake of dust in its path at the wrong moment, let a tiny flicker of light intersect it, and it went whiplash wild. It writhed like a giant snake, tore whole sections off the tube walls. Beam auroras danced in the sky above the moon then and the human attendants scurried.

A troubleshooter at the wrong spot in the tube died.

Ing pulled his hands into his suit's barrel top, adjusted his own tiny beam scope, the unit that linked him through a short reach of angspace to beam control. He checked his instruments, read his position from the modulated contact ripple through the soles of his shielded suit.

He wondered what his daughter, Lisa, was doing about now. Probably getting the boys, his grandsons, ready for the slotride to school. It made Ing feel suddenly old to think that one of his grandsons already was in Mars Polytechnic aiming for a Haigh Company career in the footsteps of his famous grandfather.

The vac suit was hot and smelly around Ing after a three-hour tour. He noted from a dial that his canned-cold temperature balance system still had an hour and ten minutes before red-line.

It's the cleaners, Ing told himself. *It has to be the vacuum cleaners. It's the old familiar cussedness of inanimate objects.*

What did that handbook say? *"Frequently it pays to look first for the characteristics of devices in use*

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which may be such that an essentially pragmatic approach offers the best chance for success. It often is possible to solve an accident or malfunction problem with straightforward and uncomplicated approaches, deliberately ignoring their more subtle aspects."

He slipped his hands back into his suit's arms, shielded his particle counter with an armored hand, cracked open the cover, peered in at the luminous dial. Immediately, an angry voice crackled in the speakers:

"Douse that light! We're beaming!"

Ing snapped the lid closed by reflex, said: "I'm in the backboard shadow. Can't see the beam." Then: "Why wasn't I told you're beaming?"

Another voice rumbled from the speakers: "It's Poss here, Ing. I'm monitoring your position by sono, told them to go ahead without disturbing you."

"What's the supetrans doing monitoring a troubleshooter?" Ing asked.

"All right, Ing."

Ing chuckled, then: "What're you doing, testing?"

"Yes. We've an inner-space transport to beam down on Titan, thought we'd run it from here."

"Did I foul the beam?"

"We're still tracking clean."

Inner-space transmission open and reliable, Ing thought, *but the long reach out to the stars was muddied.* Maybe the scare mongers were right. Maybe it was outside interference, an alien intelligence.

"We've lost two cleaners on this transmission," Washington said. "Any sign of them?"

"Negative."

They'd lost two cleaners on the transmission, Ing thought. That was getting to be routine. The flitting vacuum cleaners—supported by the beam's field, patrolling its length for the slightest trace of interference, had to be replaced at the rate of about a hundred a year normally, but the rate had been going up. As the beam grew bigger, unleashed more power for the long reach, the cleaners proved less and less effective at dodging the angtrans throw, the controlled whiplash. No part of a cleaner survived contact with the beam. They were energy-charged in phase with the beam, keyed for instant dissolution to add their energy to the transmission.

"It's the damned cleaners," Ing said.

"That's what you all keep saying," Washington said.

Ing began prowling to his right. Somewhere off there the glassite floor curved gradually upward and became a wall—and then a ceiling. But the opposite side was always two kilometers away, and the Moon's gravity, light as that was, imposed limits on how far he could walk up the wall. It wasn't like the little Phobos beam where they could use a low-power magnafield outside and walk right around the tube.

He wondered then if he was go-

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ing to insist on riding one of the cleaners . . . the way the six others had done.

Ing's shuffling, cautious footsteps brought him out of the anode backboard's shadow. He turned, saw a pencil line of glowing purple stretching away from him to the cathode twelve kilometers distant. He knew there actually was no purple glow, that what he saw was a visual simulation created on the one-way surface of his faceplate, a reaction to the beam's presence displayed there for his benefit alone.

Washington's voice in his speaker said: "Sono has you in Zone Yellow. Take it easy, Ing."

Ing altered course to the right, studied the beam.

Intermittent breaks in the purple line betrayed the presence between himself and that lambent energy of the robot vacuum cleaners policing the perimeter, hanging on the sine lines of the beam field like porpoises gamboling on a bow wave.

"Transport's down," Washington said. "We're phasing into a long-throw test. Ten-minute program."

Ing nodded to himself, imagined Washington sitting there in the armored bubble of the control room, a giant, with a brooding face, eyes alert and glittering. Old Poss didn't want to believe it was the cleaners, that was sure. If it was the cleaners, someone was going to have to ride the wild goose. There'd be more deaths . . . more rides . . . until they tested out the new theory. It certainly was a helluva time for someone to come up with an anomaly *hole* in the angtrans math. But that's what someone back at one of the trans-time computers on Earth had done . . . and if he was right—then the problem had to be the cleaners.

Ing studied the shadow breaks in the beam—robotic torpedoes, sensor-trained to collect the tiniest debris. One of the shadows suddenly reached away from him in both directions until the entire beam was hidden. A cleaner was approaching him. Ing waited for it to identify the Authorized Intruder markings which it could *see* the same way he saw the beam.

The beam reappeared.

"Cleaner just looked you over," Washington said. "You're getting in pretty close."

Ing heard the worry in his friend's voice, said: "I'm all right long's I stay up here close to the board."

He tried to picture in his mind then the cleaner lifting over him and returning to its station along the beam.

"I'm plotting you against the beam," Washington said. "Your shadow width says you're approaching Zone Red. Don't crowd it, Ing. I'd rather not have to clean a fried troubleshooter out of there."

"Hate to put you to all that extra work," Ing said.

"Give yourself plenty of 'lash room."

"I'm miking the beam thickness

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against my helmet crosshairs, Poss. Relax."

Ing advanced another two steps, sent his gaze traversing the beam's length, seeking the beginnings of the controlled whiplash which would *throw* the test message into angspace. The chained energy of the purple rope began to bend near its center far down the tube. It was an action visible only as a gentle flickering outward against the crosshairs of his faceplate.

He backed off four steps. The throw was a chancey thing when you were this close—and if interfering radiation ever touched that beam . . .

Ing crouched, sighted along the beam, waited for the throw. An experienced troubleshooter could tell more from the way the beam whipped than banks of instruments could reveal. Did it push out a double bow? Look for faulty field focus. Did it waver up and down? Possible misalignment of vertical hold. Did it split or spread into two loops? Synchronization problem.

But you had to be in here close and alert to that fractional margin between good seeing and *good night!* forever.

Cleaners began paying more attention to him in this close, but he planted himself with his AI markings visible to them, allowing them to fix his position and go on about their business.

To Ing's trained eye, cleaner action appeared more intense, faster than normal. That agreed with all the previous reports—unless a perimeter gap had admitted stray foreign particles, or perhaps tiny shades dislodged from the tube's walls by the pulse of the moon's own life.

Ing wondered then if there could be an overlooked hole in the fanatic quadruple-lock controls giving access to the tube. But they'd been sniffing along that line since the first sign of trouble. Not likely a hole would've escaped the inspectors. No—it was in here. And cleaner action *was* increased, a definite lift in tempo.

"Program condition?" Ing asked.

"Transmission's still Whorf positive, but we haven't found an angspace opening yet."

"Time?"

"Eight minutes to program termination."

"Cleaner action's way up," Ing said. "What's the dirt count?"

A pause, then: "Normal."

Ing shook his head. The monitor that kept constant count on the quantity of debris picked up by the cleaners shouldn't show normal in the face of this much activity.

"What's the word from Mare Nubium transmitter?" Ing asked.

"Still shut down and full of inspection equipment. Nothing to show for it at last report."

"Imbrium?"

"Inspection teams are out and they expect to be back into test phase by 0900. You're not thinking

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of ordering *us* to shut down for a complete clean-out?"

"Not yet."

"We've a budget to consider, too, Ing. Remember that."

Huh! Ing thought. *Not like Poss to worry about budget in this kind of an emergency. He trying to tell me something?*

What did the handbook say? *"The good troubleshooter is cost conscious, aware that down time and equipment replacement are factors of serious concern to the Haigh Company."*

Ing wondered then if he should order the tube opened for thorough inspection. But the Imbrium and Nubium tubes had revealed nothing and the decontamination time *was* costly. They were the older tubes, though—Nubium the first to be built. They were smaller than Nectaris, simpler locks. But their beams weren't getting through any better than the Nectaris tube with its behemoth size, greater safeguards.

"Stand by," Washington said. "We're beginning to get whipcount on the program."

In the abrupt silence, Ing saw the beam curl. The whiplash came down the twelve kilometers of tube curling like a purple wave, traveling the entire length in about two thousandths of a second. It was a thing so fast that the visual effect was of seeing it *after* it had happened.

Ing stood up, began analyzing what he had seen. The beam had appeared clean, pure—a perfect throw . . . except for one little flare near the far end and another about midway. Little flares. The after-image was needle shaped, rigid . . . pointed.

"How'd it look?" Washington asked.

"Clean," Ing said. "Did we get through?"

"We're checking," Washington said, then: "Limited contact. Very muddy. About thirty per cent . . . just about enough to tell us the container's still there and its contents seem to be alive."

"Is it in orbit?"

"Seems to be. Can't be sure."

"Give me the cleaner count," Ing said.

A pause, then: "Damnation! We're down another two."

"Exactly two?"

"Yes. Why?"

"Dunno yet. Do your instruments show beam deflections from hitting two cleaners? What's the energy sum?"

"Everyone thinks the cleaners are causing this," Washington muttered. "I tell you they couldn't. They're fully phased *with* the beam, just add energy to it if they hit. They're *not* debris!"

"But does the beam really eat them?" Ing asked. "You saw the anomaly report."

"Oh, Ing, let's not go into that again." Washington's voice sounded tired, irritated.

The stubbornness of Washing-

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ton's response confused Ing. This wasn't like the man at all. "Sure," Ing said, "but what if they're going somewhere we can't see?"

"Come off that, Ing! You're as bad as all the others. If there's one place we know they're *not* going, that's into angspace. There isn't enough energy in the universe to put cleaner mass around the corner."

"Unless that hole in our theories really exists," Ing said. And he thought: *Poss is trying to tell me something. What? Why can't he come right out and say it?* He waited, wondering at an idea that nibbled at the edge of his mind—a concept . . . What was it? Some half-forgotten association . . .

"Here's the beam report," Washington said. "Deflection shows only one being taken, but the energy sum's doubled all right. One balanced out the other. That happens."

Ing studied the purple line, nodding to himself. The beam was almost the color of a scarf his wife had worn on their honeymoon. She'd been a good wife, Jennie—raising Lisa in Mars camps and blister pods, sticking with her man until the canned air and hard life had taken her.

The beam lay quiescent now with only the faintest auroral bleed off. Cleaner tempo was down. The test program still had a few minutes to go, but Ing doubted it'd produce another throw into angspace. You acquired an instinct for the transmission pulse after a while. You could sense when the beam was going to open its tiny signal window across the light-years.

"I saw both of those cleaners go," Ing said. "They didn't seem to be torn apart or anything—just flared out."

"Energy consumed," Washington said.

"Maybe."

Ing thought for a moment. A hunch was beginning to grow in him. He knew a way to test it. The question was: Would Poss go along with it? Hard to tell in his present mood. Ing wondered about his friend. Darkness, the isolation of this position within the tube gave voices from outside a disembodied quality.

"Poss, do me a favor," Ing said. "Give me a straight 'lash-gram. No fancy stuff, just a demonstration throw. I want a clean ripple the length of the beam. Don't try for angspace, just lash it."

"Have you popped your skull? Any lash can hit angspace. And you get one fleck of dust in that beam path . . ."

"We'd rip the sides off the tube; I know. But this is a clean beam, Poss. I can see it. I just want a little ripple."

"Why?"

Can I tell him? Ing wondered.

Ing decided to tell only part of the truth, said: "I want to clock the cleaner tempo during the program. Give me a debris monitor and a

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crossing count for each observation post. Have them focus on the cleaners, not on the beam."

"Why?"

"You can see for yourself cleaner activity doesn't agree with the beam condition," Ing said. "Something's wrong there—accumulated programming error or . . . I dunno. But I want some actual facts to go on—a physical count during a 'lash."

"You're not going to get new data running a test that could be repeated in the laboratory."

"This isn't a laboratory."

Washington absorbed this, then: "Where would you be during the 'lash?"

He's going to do it, Ing thought. He said: "I'll be close to the anode end here. 'Lash can't swing too wide here."

"And if we damage the tube?"

Ing hesitated remembering that it was a friend out there, a friend with responsibilities. No telling who might be monitoring the conversation, though . . . and this test was vital to the idea nibbling at Ing's awareness.

"Humor me, Poss," Ing said.

"Humor him," Washington muttered. "All right, but this'd better not be humorous."

"Wait 'till I'm in position," Ing said. "A straight 'lash."

He began working up the tube slope out of Zone Yellow into the Gray and then the White. Here, he turned, studied the beam. It was a thin purple ribbon stretching off left and right—shorter on the left toward the anode. The long reach of it going off toward the cathode some twelve kilometers to his right was a thin wisp of color broken by the flickering passage of cleaners.

"Any time," Ing said.

He adjusted the suit rests against the tube's curve, pulled his arms into the barrel top, started the viewplate counter recording movement of the cleaners. Now came the hard part—waiting and watching. He had a sudden feeling of isolation then, wondering if he'd done the right thing. There was an element of burning bridges in this action.

What did the handbook say? *"There is no point in planning sophisticated research on a specific factor's role unless that factor is known to be present."*

If it isn't there, you can't study it, Ing thought.

"You will take your work seriously," he muttered. Ing smiled then, thinking of the tragicomic faces, the jowly board chairmen he visualized behind the handbook's pronouncements. Nothing was left to chance—no task, no item of personal tidiness, no physical exercise. Ing considered himself an expert on handbooks. He owned one of the finest collections of them dating from ancient times down to the present. In moments of boredom he amused himself with choice quotes.

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"Program going in," Washington said. "I wish I knew what you hope to find by this."

"I quote," Ing said. "The objective worker makes as large a collection of data as possible and analyzes these in their entirety in relation to selected factors whose relationship to a questioned phenomenon is to be investigated."

"What the devil's that supposed to mean?" Washington demanded.

"Damned if I know," Ing said, "but it's right out of the Haigh Handbook." He cleared his throat. "What's the cleaner tempo from your stations?"

"Up a bit."

"Give me a countdown on the 'lash."

"No sign yet. There's . . . wait a minute! Here's some action—twenty-five . . . twenty seconds."

Ing began counting under his breath.

Zero.

A progression of tiny flares began far off to his right, flickered past him with increasing brightness. They were a blur that left a glimmering after image. Sensors in his suit soles began reporting the fall of debris.

"Holy O'Golden!" Washington muttered.

"How many'd we lose?" Ing asked. He knew it was going to be bad—worse than he'd expected.

There was a long wait, then Washington's shocked voice: "A hundred and eighteen cleaners down. It isn't possible!"

"Yeah," Ing said. "They're all over the floor. Shut off the beam before that dust drifts up into it."

The beam disappeared from Ing's faceplate responders.

"Is that what you thought would happen, Ing?"

"Kind of."

"Why didn't you warn me?"

"You wouldn't have given me that 'lash."

"Well how the devil're we going to explain a hundred and eighteen cleaners? Accounting'll be down on my neck like a . . ."

"Forget Accounting," Ing said. "You're a beam engineer; open your eyes. Those cleaners weren't absorbed by the beam. They were cut down and scattered over the floor."

"But the . . ."

"Cleaners are designed to respond to the beam's needs," Ing said. "As the beam moves they move. As the debris count goes up, the cleaners work harder. If one works a little too hard and doesn't get out of the way fast enough, it's supposed to be absorbed—its energy converted by the beam. Now, a false 'lash catches a hundred and eighteen of them off balance. Those cleaners weren't eaten; they were scattered over the floor."

There was silence while Washington absorbed this.

"Did that 'lash touch angspace?" Ing asked.

"I'm checking," Washington said. Then: "No . . . wait a minute: there's a whole ripple of angspace. .

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contacts, very low energy—a series lasting about an eighty-millionth of a second. I had the responders set to the last decimal or we'd have never caught it."

"To all intents and purposes we didn't touch," Ing said.

"Practically not." Then: "Could somebody in cleaner programming have flubbed the dub?"

"On a hundred and eighteen units?"

"Yeah. I see what you mean. Well, what're we going to say when they come around for an explanation?"

"We quote the book. 'Each problem should be approached in two stages: (1) locate those areas which contribute most to the malfunction, and (2) take remedial action designed to reduce hazards which have been positively identified.' We tell 'em, Poss, that we were positively identifying hazards."

Ing stepped over the lock sill into the executive salon, saw that Washington already was seated at the corner table which convention reserved for the senior beam engineer on duty, the Supervisor of Transmission.

It was too late for day lunch and too early for the second shift coffee break. The salon was almost empty. Three junior executives at a table across the room to the right were sharing a private joke, but keeping it low in Washington's presence. A security officer sat nursing a teabulb beside the passage to the kitchen tram on the left. His shoulders bore a touch of dampness from a perspiration reclaimer to show that he had recently come down from the surface. Security had a lot of officers on the station, Ing noted . . . and there always seemed to be one around Washington.

The vidwall at the back was tuned to an Earthside news broadcast: There were hints of political upsets because of the beam failure, demands for explanations of the money spent. Washington was quoted as saying a solution would be forthcoming.

Ing began making his way toward the corner, moving around the empty tables.

Washington had a coffeebulb in front of him, steam drifting upward. Ing studied the man—Possible Washington (Impossible, according to his junior engineers) was a six-foot eight-inch powerhouse of a man with wide shoulders, sensitive hands, a sharply Moorish-Semitic face of café au lait skin and startlingly blue eyes under a dark crewcut. (The company's senior medic referred to him as "a most amazing throw of the genetic dice.") Washington's size said a great deal about his abilities. It took a considerable expenditure to lift his extra kilos Moonside. He had to be worth just that much more.

Ing sat down across from Washington, gestured to the waiter-eye

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on the table surface, ordered Mars-lichen tea.

"You just come from Assembly?" Washington asked.

"They said you were up here," Ing said. "You look tired. Earthside give you any trouble about your report?"

"Until I used your trick and quoted the book: 'Every test under field conditions shall approximate as closely as possible the conditions set down by laboratory precedent.' "

"Hey, that's a good one," Ing said. "Why didn't you tell them you were following a hunch—you had a hunch I had a hunch."

Washington smiled.

Ing took a deep breath. It felt good to sit down. He realized he'd worked straight through two shifts without a break.

"You look tired yourself," Washington said.

Ing nodded. Yes, he was tired. He was too old to push this hard. Ing had few illusions about himself. He'd always been a runt, a little on the weak side—skinny and with an almost weaselish face that was saved from ugliness by widely set green eyes and a thick crewcut mop of golden hair. The hair was turning gray now, but the brain behind the wide brow still functioned smoothly.

The teabulb came up through the table slot. Ing pulled the bulb to him, cupped his hands around its warmth. He had counted on Washington to keep the worst of the official pressure off him, but now that it had been done, Ing felt guilty.

"No matter how much I quote the book," Washington said, "they don't like that explanation."

"Heads will roll and all that?"

"To put it mildly."

"Well, we have a position chart on where every cleaner went down," Ing said. "Every piece of wreckage has been reassembled as well as possible. The undamaged cleaners have been gone over with the proverbial comb of fine teeth."

"How long until we have a clean tube?" Washington asked.

"About eight hours."

Ing moved his shoulders against the chair. His thigh muscles still ached from the long session in the Skoarnoff tube and there was a pain across his shoulders.

"Then it's time for some turkey talk," Washington said.

Ing had been dreading this moment. He knew the stand Washington was going to take.

The Security officer across the room looked up, met Ing's eyes, looked away. *Is he listening to us?* Ing wondered.

"You're thinking what the others thought," Washington said. "That those cleaners were kicked around the corner into angspace."

"One way to find out," Ing said.

There was a definite lift to the Security officer's chin at that remark. He *was* listening.

"You're not taking that suicide ride," Washington said.

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"Are the other beams getting through to the Seed Ships?" Ing asked.

"You know they aren't!"

Across the room, the junior executives stopped their own conversation, peered toward the corner table. The Security officer hitched his chair around to watch both the executives and the corner table.

Ing took a sip of his tea, said: "Damn' tea here's always too bitter. They don't know how to serve it anywhere except on Mars." He pushed the bulb away from him. "Join the Haigh Company and save the Universe for Man."

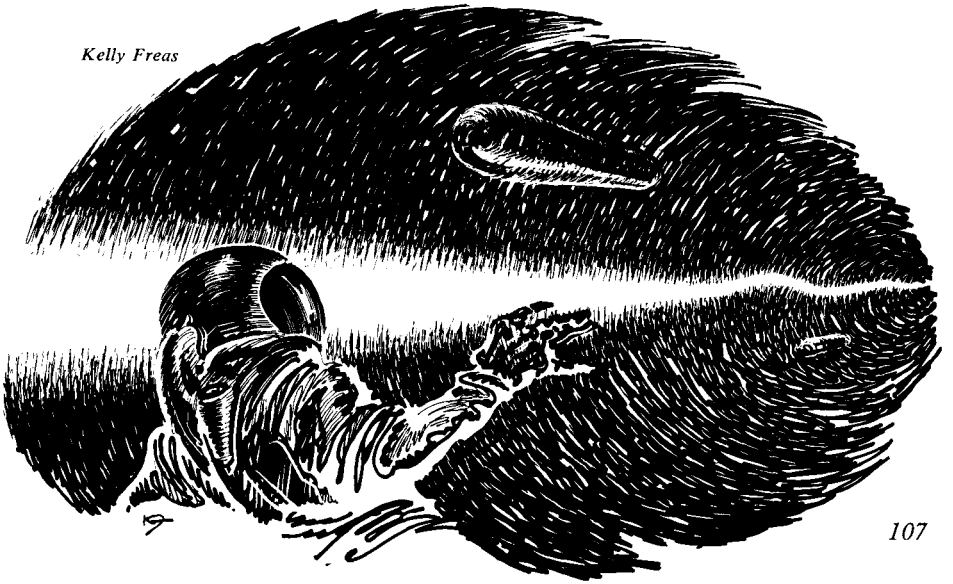
"All right, Ing," Washington said. "We've known each other a long time and can speak straight out. What're you hiding from me?"

Ing sighed.

"I guess I owe it to you," he said. "Well, I guess it begins with the fact that every transmitter's a unique individual, which you know as well as I do. We map what it does and operate by prediction statistics. We play it by ear, as they say. Now, let's consider something out of the book. A tube is, after all, just a big cave in the rock, a controlled environment for the beam to do its work. The book says: *'By anglespace transmission, any place in the universe is just around the corner from any other place.'* This is a damned loose way to describe something we don't really understand. It makes it sound as though we know what we're talking about."

"And you say we're putting matter around that corner," Washington said, "but you haven't told me what you're—"

"I know," Ing said. "We place a



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modulation of energy where it can be *seen* by the Seed Ship's instruments. But that's a transfer of energy, Poss. And energy's interchangeable with matter."

"You're twisting definitions. We put a highly unstable, highly transitory reflection phenomenon in such a position that time/space limitations are changed. That's by the book, too. But you're still not telling me . . ."

"Poss, I have a crew rigging a cleaner for me to ride. We've analyzed the destruction pattern—which is what I wanted from that test 'lash—and I *think* we can kick me into angspace aboard one of these wild geese."

"You fool! I'm still Supetrans here and I say you're not going in there on . . ."

"Now, take it easy, Poss. You haven't even . . ."

"Granting you get kicked around that stupid corner, how do you expect to get back? And what's the purpose, anyway? What can you do if you . . ."

"I can go there and look, Poss. And the cleaner we're rigging will be more in the nature of a lifeboat. I can get down on TA-IV, maybe take the container with me, give our *seeds* a better chance. And if we learn how to kick me around there, we can do it again with . . ."

"This is stupidity!"

"Look," Ing said. "What're we risking? One old man long past his prime."

Ing faced the angry glare in Washington's eyes and realized an odd thing about himself. He wanted to get through there, wanted to give that container of embryos its chance. He was drunk with the same dream that had spawned the Seeding Compact. And he saw now that the other troubleshooters, the six who'd gone before him, must have been caught in the same web. They'd all seen where the trouble had to be. One of them would get through. There were tools in the container; another beam could be rigged on the other side. There was a chance of getting back . . . afterward . . .

"I let them talk me into sending for you," Washington growled. "The understanding was you'd examine the set up, confirm or deny what the others saw—but I didn't have to send you into that . . ."

"I want to go, Poss," Ing said. He saw what was eating on his friend now. The man had sent six troubleshooters in there to die—or disappear into an untraceable void, which was worse. Guilt had him.

"And I'm refusing permission," Washington said.

The Security officer arose from his table, crossed to stand over Washington. "Mr. Washington," he said, "I've been listening and if seems to me if Mr. Gump wants to go you can't . . ."

Washington got to his feet, all six feet eight inches of him, caught the Security man by the jacket. "So

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they told you to interfere if I tried to stop him!" He shook the man with an odd gentleness. "If you are on my station after the next shuttle leaves, I will see to it personally that you have an unexplained accident." He released his grip.

The Security agent paled, but stood his ground. "One call from me and this no longer will be *your* station."

"Poss," Ing said, "you can't fight city hall. And if you try they'll take you out of here. Then I'll have to make do with second best at this end. I need you as beam jockey here when I ride that wild goose."

Washington glared at him. "Ing, it won't work!"

Ing studied his friend, seeing the pressures which had been brought to bear, understanding how Earthside had maneuvered to get that request sent from a friend to Ivar Norris Gump. It all said something about Earthside's desperation. The patterns of secrecy, the Security watch, the hints in the newscasts—Ing felt something of the same urgency himself which these things betrayed. And he knew if Washington could overcome this guilt block the man would share mankind's need to help those drifting containers.

"No matter how many people get hurt—or killed," Ing said, "we have to give the embryos in those containers their chance. You know, I'm right—this is the main chance. And we need you, Poss. I want everything going for me I can get. And no matter what happens, we'll know you did your best for me . . ."

Washington took two short breaths. His shoulders slumped. "And nothing I say . . ."

"Nothing you say."

"You're going?"

"I'm going where the wild goose goes."

"And who faces the family afterward?"

"A friend, Poss. A friend faces the family and makes the blow as soft as possible."

"If you'll excuse me," the Security man said.

They ignored him as the man returned to his table.

Washington allowed himself a deep, sighing breath. Some of the fire returned to his eyes. "All right," he growled. "But I'm going to be on this end every step of the way. And I'm telling you now you get no Go signal until everything's rigged to my satisfaction."

"Of course, Poss. That's why I can't afford to have you get into a fracas and be booted out of here."

Ing's left ankle itched.

It was maddening. His hand could reach only to the calf inside the webbing of his shieldsuit. The ankle and its itch could not be lifted from the area of the sole contact controls.

The suit itself lay suspended in an oil bath within a shocktank. Around the shocktank was something that resembled a standard cleaner in shape but not in size. It

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was at least twice the length of a cleaner and it was fatter. The fatness allowed for phased shells—Washington's idea. It had grown out of analysis of the debris left by the test 'lash.

The faint hissing of his oxygen regenerators came to Ing through his suit sensors. His viewplate had been replaced by a set of screens linked to exterior pickups. The largest screen, at top center, reported the view from a scanner on the belly. It showed a rope of fluorescing purple surrounded by blackness.

The beam.

It was a full five centimeters across, larger than Ing had ever before seen it. The nearness of that potential violence filled him with a conditioned dread. He'd miked too many beams in too many tubes, wary of the slightest growth in size to keep him at a safe distance.

This was a monster beam. All his training and experience cried out against its size.

Ing reminded himself of the analysis which had produced the false cleaner around him now.

Eighty-nine of the cleaners recovered from the tube floor had taken their primary damage at the pickup orifice. They'd been oriented to the beam itself, disregarding the local particle count. But the most important discovery was that the cleaners had fallen through the beam without being sliced in two. They had passed completely through the blade of that purple knife without being severed. There'd been no break in the beam. The explanation had to rest in that topological anomaly—angspace. Part of the beam and/or the cleaners had gone into angspace.

He was gambling his life now that the angspace bounce coincided with the energy phasing which kept the cleaners from deflecting the beam. The outside carrier, Ing's false cleaner, was phased with the beam. It would be demolished. The next inner shell was one hundred and eighty degrees out of phase. The next shell was back in phase. And so on for ten shells.

In the center lay Ing, his hands and feet on the controls of a suit that was in effect a miniature lifeboat.

As the moment of final commitment approached, Ing began to feel a prickly sensation in his stomach. And the ankle continued to itch. But there was no way he could turn back and still live with himself. He was a troubleshooter, the best in the Haigh Company. There was no doubt that the company—and those lonely drifting human embryos had never needed him more desperately.

"Report your condition, Ing."

The voice coming from the speaker beside Ing's facemike was Washington's with an unmistakable edge of fear in it.

"All systems clear," Ing said.

"Program entering its second section," Washington said. "Can you see any of the other cleaners?"

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"Forty contacts so far," Ing said. "All normal." He gasped as his cleaner dodged a transient 'lash.

"You all right?"

"All right," Ing said.

The ride continued to be a rough one, though. Each time the beam lashed, his cleaner dodged. There was no way to anticipate the direction. Ing could only trust his suit webbing and the oil-bath shocktank to keep him from being smashed against a side of the compartment.

"We're getting an abnormal number of transients," Washington said.

That called for no comment and Ing remained silent. He looked up at his receiver above the speaker. A quartz window gave him a view of the tiny beam which kept him in contact with Washington. The tiny beam, less than a centimeter long, glowed sharply purple through its inspection window. It, too, was crackling and jumping. The little beam could stand more interference than a big one, but it clearly was disturbed.

Ing turned his attention to the big beam in the viewscreen, glanced back at the little beam. The difference was a matter of degree. It often seemed to Ing that the beams should illuminate the area around them, and he had to remind himself that the parallel quanta couldn't deviate that much.

"Getting 'lash count," Washington said. "Ing! Condition critical! Stand by."

Ing concentrated on the big beam now. His stomach was a hard knot. He wondered how the other troubleshooters had felt in this moment. The same, no doubt. But they'd been flying without the protection Ing had. They'd paved the way, died to give information.

The view of the beam was so close and restricted that Ing knew he'd get no warning of the whip—just a sudden shift in size or position.

His heart leaped as the beam flared in the screen. The cleaner rolled sideways as it dodged, letting the beam pass to one side, but there was an ominous bump. Momentarily, the screen went blank, but the purple rope flickered back into view as his cleaner's sensors lined up and brought him back into position.

Ing checked his instruments. That bump—what had that been?

"Ing!" Washington's voice came sharply urgent from the speaker.

"What's the word?"

"We have one of the other cleaners on grav-track," Washington said. "It's in your shadow. Hold on."

There came a murmur of voices, hushed words, indistinguishable, then: "The beam touched you, Ing. You've got a phase arc between two of your shells on the side opposite the beam. One of the other cleaners has locked onto that arc with one of its sensors. Its other sensors are still on the beam and it's riding parallel with you, in your shadow. We're getting you out of there."

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Ing tried to swallow in a dry throat. He knew the danger without having it explained. There was an arc, light in the tube. His cleaner was between the arc and the beam, but the other cleaner was up there behind him, too. If they had to dodge a 'lash, the other cleaner would be confused because its sensor contacts were now split. It'd be momentarily delayed. The two cleaners would collide and release light in the tube. The big beam would go wild. The protective shells would be struck from all sides.

Washington was working to get him out, but that would take time. You couldn't just yank a primary program out. That created its own 'lash conditions. And if you damped the beam, the other cleaners would home on the arc. There'd be carnage in the tube.

"Starting phase out," Washington said. "Estimating three minutes to control the second phase. We'll just . . ."

"Lash!"

The word rang in Ing's ears even as he felt his cleaner lift at the beginning of a dodge maneuver. He had time to think that the warning must've come from one of the engineers on the monitor board, then a giant gong rang out.

A startled: "What the hell!" blasted from his speaker to be replaced by a strident hissing, the ravening of a billion snakes.

Ing felt his cleaner still lifting, pressing him down against the webbing, his face hard against the protective mask. There was no view of the big beam in his screen and the little window which should've showed the line of his own small beam revealed a wavering, crackling worm of red-purple.

Abruptly, Ing's world twisted inside out.

It was like being squeezed flat into a one-molecule puddle and stretched out to infinity. He *saw* around the outside of an inner-viewed universe with light extended to hard rods of brilliance that poked through from one end to the other. He realized he wasn't seeing with his eyes, but was absorbing a sensation compounded from every sense organ he possessed. Beyond this inner view everything was chaos, undefined madness.

The beam got me, he thought. *I'm dying.*

One of the light rods resolved itself into a finite row of spinning objects—over, under, around . . . over, under, around. . . . The movement was hypnotic. With a feeling of wonder, Ing recognized that the object was his own suit and a few shattered pieces of the protective shells. The tiny beam of his own transmitter had been opened and was spitting shards of purple.

With the recognition came a sensation of being compressed. Ing felt himself being pushed down into the blackness that jerked at him, twisting, pounding. It was like going over

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a series of rapids. He felt the web harness bite into his skin.

Abruptly, the faceplate viewscreens showed jewel brilliance against velvet black—spots of light: sharp blue, red, green, gold. A glaring white light spun into view surrounded by whipping purple ribbons. The ribbons looked like beam auroras.

Ing's body ached. His mind felt as though immersed in fog, every thought laboring against deadly slowness.

Jewel brilliance—spots of light.

Again, glaring white.

Purple ribbons.

The speaker above him crackled with static. Through its window, he saw his tiny beam spattering and jumping. It seemed important to do something about that. Ing slipped a hand into one of his suit arms, encountered a shattered piece of protective shell drifting close.

The idea of drifting seemed vital, but he couldn't decide why.

Gently, he nudged the piece of shell up until it formed a rough shield over his receiver beam.

Immediately, a tinny little voice came from his speaker: "Ing! Come in, Ing! Can you hear me, Ing?" Then, more distant: "You there! To hell with the locks! Suit up and get in there. He must be down . . ."

"Poss?" Ing said.

"Ing! Is that you, Ing?"

"Yeah, Poss. I'm . . . I seem to be all in one piece."

"Are you down on the floor some place? We're coming in after you. Hold on."

"I dunno where I am. I can see beam auroras."

"Don't try to move. The tube's all smashed to hell. I'm patched through the Imbrium tube to talk to you. Just stay put. We'll be right with you."

"Poss, I don't think I'm in the tube."

From some place that Ing felt existed on a very tenuous basis, he felt his thoughts stirring, recognition patterns forming.

Some of the jewel brilliance he saw was stars. He saw that now. Some of it was . . . debris, bits and pieces of cleaners, odd chunks of matter. There was light somewhere toward his feet, but the sensors there appeared to've been destroyed or something was covering them.

Debris.

Beam auroras.

The glaring white spun once more into view. Ing adjusted his spin with a short burst from a finger jet. He saw the thing clearly now, recognized it: the ball and sensor tubes of a Seeding Compact container.

He grew conscious that the makeshift shield for his little beam had slipped. Static filled his speakers. Ing replaced the bit of shell.

". . . Do you mean you're not in the tube?" Washington's voice asked. "Ing, come in. What's wrong?"

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"There's an SC container about a hundred meters or so directly in front of me," Ing said. "It's surrounded by cleaner debris. And there're auroras, angspace ribbons, all over the sky here. I . . . think I've come through."

"You couldn't have. I'm receiving you too strong. What's this about auroras?"

"That's why you're receiving me," Ing said. "You're stitching a few pieces of beam through here. Light all over the place; there's a sun down beneath my feet somewhere. You're getting through to me, but the container's almost surrounded by junk. The reflection and beam spatter in there must be enormous. I'm going in now and clean a path for the beam contact."

"Are you sure you're . . ." *Hiss, crackle.*

The little piece of shell had slipped again.

Ing eased it back into position as he maneuvered with his belt jets.

"I'm all right, Poss."

The turn brought the primary into view—a great golden ball that went dim immediately as his scanner filters adjusted. To his right beyond the sun lay a great ball of blue with chunks of cottony clouds drifting over it. Ing stared, transfixed by the beauty of it.

A virgin planet.

A check of the lifeboat instruments installed in his suit showed what the SC container had revealed before contact had gone intermittent—Theta Apus IV, almost Earth normal except for larger oceans, smaller land masses.

Ing took a deep breath, smelled the canned air of his suit.

To work, he thought.

His suit jets brought him in close to the debris and he began nudging it aside, moving in closer and closer to the container. He lost his beam shield, ignored it, cut down receiver volume to reduce the static.

Presently, he drifted beside the container.

With an armored hand, he shielded his beam.

"Poss? Come in, Poss."

"Are you really there, Ing?"

"Try a beam contact with the container, Poss."

"We'll have to break contact with you."

"Do it."

Ing waited.

Auroral activity increased—great looping ribbons over the sky all around him.

So that's what it looks like at the receiving end, Ing thought. He looked up at the window revealing his own beam—clean and sharp under the shadow of his upraised hand. The armored fingers were black outlines against the blue world beyond. He began calculating then how long his own beam would last without replacement of anode and cathode. Hard bombardment, sharp tiny beam—its useful life would only

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be a fraction of what a big beam could expect.

Have to find a way to rig a beam once we get down, he thought.

"Ing? Come in, Ing?"

Ing heard the excitement in Washington's voice.

"You got through, eh, Poss, old hoss?"

"Loud and clear. Now, look—if you can weld yourself fast to the tail curve of that container we can get you down with it. It's over-engineered to handle twice your mass on landing sequence."

Ing nodded to himself. Riding the soft, safe balloon, which the container would presently become, offered a much more attractive prospect than maneuvering his suit down, burning it out above a watery world where a landing on solid ground would take some doing.

"We're maneuvering to give reentry for contact with a major land mass," Washington said. "Tell us when you're fast to the container."

Ing maneuvered in close, put an armored hand on the container's surface, feeling an odd sensation of communion with the metal and life that had spent nine hundred years in the void.

Old papa Ing's going to look after you, he thought.

As he worked, welding himself solidly to the tail curve of the container, Ing recalled the chaos he had glimpsed in his spewing, jerking ride through angspace. He shuddered.

"Ing, when you feel up to it, we want a detailed report," Washington said. "We're planning now to put people through for every one of the containers that's giving trouble."

"You figured out how to get us back?" Ing asked.

"Earthside says it has the answer if you can assemble enough mass at your end to anchor a full-sized beam."

Again, Ing thought of that ride through chaos. He wasn't sure he wanted another such trip. Time to solve that problem when it arose, though. There'd be something in the book about it.

Ing smiled at himself then, sensing an instinctive reason for all the handbooks of history. Against chaos, man had to raise a precise and orderly alignment of actions, a system within which he could sense his own existence.

A watery world down there, he thought. *Have to find some way to make paper for these kids before they come out of their vats. Plenty of things to teach them.*

Watery world.

He recalled then a sentence of swimming instructions from the "Blue Jackets Manual," one of the ancient handbooks in his collection: "Breathing may be accomplished by swimming with the head out of water."

Have to remember that one, he thought. *The kids'll need a secure and orderly world.* ■

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TECHNICALITY

The Funny Bunnies were anything but funny, and they were much too alien to be bunnies—but they were in their peculiar way most decidedly dangerous . . .

NORMAN SPINRAD

We were pretty well dug in at the base of a long, gently sloping ridge, with six Empie pillboxes guarding the crest, spread kind of thin. This was near the end of the war, when everyone knew that the Empies had had it, but the big boys were still not telling the civvies why. We knew that the ridge was just about all that the Empies had between us and their last real concentration in this part of the state, and tomorrow morning we were going over the top. By this time, the brass had finally got it through their thick skulls that night attacks were just too much to ask from anyone.

Well, up to the lines comes the kid, Barker's replacement, just as the Empies on top of the ridge decide to keep us honest with a brace of barf-bombs. The kid sees those four rockets coming down at us fat and lazy, and he gets the message or at least thinks he does. Without a "Howdy-do" or "Hello, Sarge," he's face downward in the dirt behind me. The wind being in our faces, the Empies have, of course, lobbed the barf-bombs short and the green gas is rolling slowly toward us. We've got maybe a minute, maybe two.

The kid looks up with a face full of mud and he says, "They missed us, huh, Sarge?"

"You have supper yet, kid?"

"Why, yeah, thanks, Sarge. I—"

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"Too bad," I have time to say, and then the gut-gas hits, heavy green stuff that works on skin-contact so masks are useless, and we are all too busy gagging and puking to continue the conversation.

A couple of boys in the platoon are still insisting on shooting back up at the Empie emplacements every time they lob something at us, but the Funny Bunnies are way down underground, and when the gas clears enough for me to stop gagging, I chew them out for wasting ammo. Not that they won't go and do the same thing the next time we get fed puke pills. Some jerks just take everything so damned personal.

Well, the kid wipes most of the mud mess off of himself, and you can see that now he is feeling like a real pro. "When do we get to kill us some Empies?" he asks, with what he hopes will impress me as the real gung-ho.

"You might try reporting first, Soldier," I suggest. I am up to my ears with all these Mickey Mice, and I have no energy to do the full-scale sergeant act.

So he tells me that he is Pfc. Tolan, and I tell him how overjoyed I am to see him. Like every other replacement we're getting lately, the kid is just about straight out of high school, and like all civilians, knows next to nothing about the war that's going on all around him. About all the civvies know is that almost two years back, in '72, these green characters show up from some place called Tau Ceti, in honest-to-Pete flying saucers. A real live invasion from Outer Space, just like in the movies. Well, to begin with they are mopping the floor with every army on Earth, and they conquer half of good old terra firma. We start using the big stuff, H-bombs even, and then they get real unpleasant. Every time we use even an atomic popgun, three cities get king-size doses of puke gas. Finally, the brass gets the message: the Funny Bunnies will leave the civvies alone as long as we lay off the nuclear stuff. So in 1973, we find ourselves slogging through the mud just like an old World War II movie, for the sake of the civvies' tender stomachs. Politics!

And do the civvies give a damn now? All they know is that the Empies are leaving *them* alone, and that now, for some reason that no one is really explaining, we are mopping the floor with them. The civvies are all calling the Funny Bunnies "Empies," but maybe one in ten knows that "Empie" comes from "M.P.," and the brass is making sure that no civilian below the Secretary of Defense knows what M.P. stands for. Which is about the only thing about the war that doesn't confirm my pet theory that anything above the rank of Master Sergeant is really a chimpanzee.

So, of course, what the kid asks next is, "What's the secret?"

"I give up, kid. You tell me."

"I mean the Secret Weapon. Everyone says we got a Secret Weapon,

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ever since last year when we finally started winning. What's the Secret Weapon, Sarge?"

I try not to groan too hard. I point to the kid's autorifle, which at least seems to be in working condition. "You're holding it, kid," I say. "Tomorrow morning, we all go up that hill. All you got to remember is that no matter what, and I mean *no matter what,* you keep running up that hill, and you don't turn back. That's the Secret Weapon, a gun on the end of a pair of legs. And you don't turn back. Turn back, and I blow your brains out, got it?"

The message seems to penetrate. Of course, I don't go around shooting every yuk that turns tail. If I did, I would be shooting about two platoons a week, on the average. But the first time is usually the worst, the one that makes a civvie into a soldier. I figure that, if I can make them more afraid of me than of what's happening to 'em, they got a better chance of sticking it out. Sometimes it even works.

Bright and early the next morning, up we go. We have, of course, not eaten breakfast, and we've emptied our bowels and bladders as thoroughly as possible. I keep the kid as close to me as I can, and I'm doing my best to look ferocious.

We've gone maybe twenty yards when the Empies wake up and start lobbing barf-bombs. Most of the guys are pretty much used to the dry heaves, and so we stumble and retch, but all in all make pretty good time up through the gut-gas. The kid is in a pretty bad way, but he's got guts, and he's even firing his autorifle now and then, trying to look like a soldier. I'm about to tell him to stop wasting ammo, but then I figure, what the hell so he wastes a few rounds, long as it helps keep him going.

We get through the puke-gas, which, of course, is just for openers, and then they really start opening up. Bladderbusters, bowelbillies, itchrays, freezers—just about everything but the heavy stuff. Already, some of the guys have had it, mostly the ones that have been around too long and have been getting flippy anyway.

I glance around at the kid, to see if he has noticed that I am not shooting the tail-turners, but he's far too busy twitching and scratching and shivering to notice anything. But he's still running in the right direction and firing wildly. The kid has guts.

Well, we get halfway up the hill, and the attrition rate is not too bad —more than half of us are still coming. Now we can see the tops of the Empie pillboxes, which are just steel slabs with rocketports, raynozzles and gasvents in them. There's one big hatch to each pillbox. All the guts are underground.

Then they start using the Big Stuff.

First, the Aphrogas. Ever try fighting thinking about, feeling

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about nothing but women—I mean like hitting a Mexican border town after ten years in solitary? Yeah, Aphrogas and then Panic Pills.

I'm scratching and yelling and feeling monsters all around me, like a super case of the d.t.'s, but I'm used to it. I've been in this war a whole six months, see. Well, the platoon is really falling apart now. We've been assigned number two pillbox, and the guys are, as usual, turning tail like polecats. Only me and Anders and Brown and McCuller and Gentry are still coming. And the kid. How about that, I think. That kid really has guts.

Finally, we're maybe fifty yards from the pillbox, and that's within suicide-ray range. Of course we have all had as much hypnoconditioning as we can stand, and as soon as we feel that familiar urge to slit our own throats coming on us, our adrenals cut in, and we go into what the psych-boys call Turnaround, and we're storming up the hill, thinking nothing but Kill! Kill! Kill! Either that, or running for home like scared rabbits.

The little part of me that is not yelling "Kill! Kill! Kill!" is checking the rest of the platoon. Anders and Gentry are running down the hill. Brown has not been able to take enough hypnoconditioning. He's blown his own brains out.

It's me and McCuller and the kid. Kill! Kill! Kill! Up those last fifty yards to the pillbox, and the suicide-ray getting stronger with every yard.

But we've got too much Kill! Kill! in us—me and McCuller and the kid. We scramble up on top of the pillbox lid, up to the hatch, and I pull out a grenade, and they hit us with the last-ditch weapon.

One second it's Kill! Kill! Kill!, and the next we all love the Empies. How could we ever have thought of hurting such nice green little bunnies? Who never hurt anyone. Who love us all, with a great big mother-love. Lovely little Funny Bunnies. . . . Dear little Empies . . .

McCuller sort of slips off the pillbox, blubbering. He has had it. The kid, I guess, has never had a mother. He is just about dragging me, and I wouldn't hurt the dear little Empies for all the world. Dear little enemies. Cute little . . ."

With the last bit of resistance that I have left in me, I plant the grenade atop the hatch, grab the kid, and roll us off the pillbox.

Crump! not a big explosion, and most of it is directed downward anyway. The hatch is blown off, the suicide-ray and the love-ray nozzles smashed, and it is all over.

The kid and I rush up to the hatch, and down into the pale, butter-colored light. We're inside a big warm burrow where maybe ten or so little green furry creatures are just standing around on their big haunches next to a lot of now-useless machinery. They have dumpy little bodies like beavers, little heads with long floppy ears, and the saddest expres-

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sions in their big brown eyes. They just stand there, not moving, not trying to get away, not doing anything but looking sad and innocent and helpless.

I start firing, and the kid is firing beside me, and in less than a minute there are ten furry little bodies on the ground, all torn to bits and laying in pools of the green stuff the Funny Bunnies have for blood.

It's just me and the kid and all that dead meat. Suddenly, standing there, watching the confused, sad, savage, goofy look on the kid's face and remembering how it was for me when I found out, I know that I have finally had it. I can go up a hill again, through anything they have to throw at me, but I can't shoot any more Funny Bunnies that just stand there, waiting, not doing a thing but looking like your favorite cocker spaniel. I know that they are all crazy fanatics, out to conquer anything that isn't an Empie and that someone has to stop them. But not me, not any more.

"They just stood there . . ." the kid is muttering over and over again. "They just stood there . . ."

I put my arm around the kid's shoulder. The kid had done all right. "Yeah, kid," I say quietly. "They always just stand there. That's why we keep it a secret from the civvies. They would never understand, without coming up a hill against all the hell the Empies dish out, and even then . . ."

I look down at the dead Funny Bunnies. I know I can't kill them any more, but man oh man, how I hate them. "Know what M.P. stands for, kid?" I say.

"What, Sarge?" he mutters, not realizing that he is about to learn *the* secret.

"Militant Pacifists," I tell him. "They crossed space and conquered half the world before we found out the secret. They're ruthless fanatics, who'll do anything to win, even make men kill themselves. But the Funny Bunnies just can't make themselves do one thing that we do real well, kid. They can't kill. They just never learned how. ■

In Times To Come

Next month's feature novelette will be "The Mechanic," by an author who's been much too long from these pages—Hal Clement. Complete with an exceptionally good—even for him—cover by Kelly Freas.

The mechanic involved in this item is a bio-mechanic—his business is tinkering up living organisms, making zeowhales metabolize as they should, and things like that.

Being a Hal Clement yarn, you can expect it to be a beautifully integrated exposition of the problems tinkering with DNA-RNA structures in living organisms can bring.

Also, there's a yarn by Joe Martino—another too-rare appearance

continued on page 128

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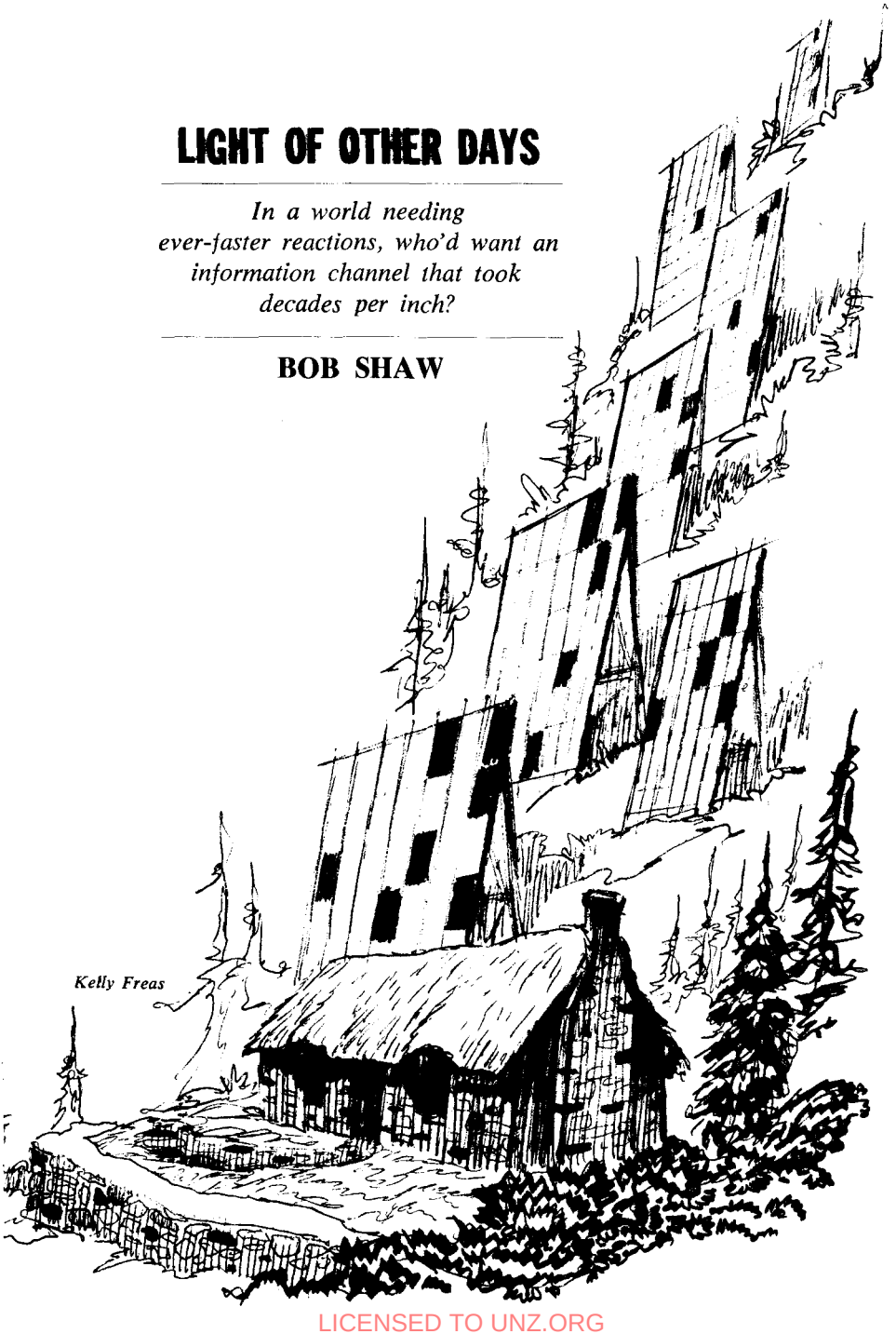
LIGHT OF OTHER DAYS

In a world needing ever-faster reactions, who'd want an information channel that took decades per inch?

BOB SHAW



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Leaving the village behind, we followed the heady sweeps of the road up into a land of slow glass.

I had never seen one of the farms before and at first found them slightly eerie—an effect heightened by imagination and circumstance. The car's turbine was pulling smoothly and quietly in the damp air so that we seemed to be carried over the convolutions of the road in a kind of supernatural silence. On our right the mountain sifted down into an incredibly perfect valley of timeless pine, and everywhere stood the great frames of slow glass, drinking light. An occasional flash of afternoon sunlight on their wind bracing created an illusion of movement, but in fact the frames were deserted. The rows of windows had been standing on the hillside for years, staring into the valley, and men only cleaned them in the middle of the night when their human presence would not matter to the thirsty glass.

They were fascinating, but Selina and I didn't mention the windows. I think we hated each other so much we both were reluctant to sully anything new by drawing it into the nexus of our emotions. The holiday, I had begun to realize, was a stupid idea in the first place. I had thought it would cure everything, but, of course, it didn't stop Selina being pregnant and, worse still, it didn't even stop her being angry about being pregnant.

Rationalizing our dismay over her condition, we had circulated the usual statements to the effect that we would have *liked* having children—but later on, at the proper time. Selina's pregnancy had cost us her well-paid job and with it the new house we had been negotiating and which was far beyond the reach of my income from poetry. But the real source of our annoyance was that we were face to face with the realization that people who say they want children later always mean they want children never. Our nerves were thrumming with the knowledge that we, who had thought ourselves so unique, had fallen into the same biological trap as every mindless rutting creature which ever existed.

The road took us along the southern slopes of Ben Cruachan until we began to catch glimpses of the gray Atlantic far ahead. I had just cut our speed to absorb the view better when I noticed the sign spiked to a gatepost. It said: "SLOW GLASS—Quality High, Prices Low —J. R. Hagan." On an impulse I stopped the car on the verge, wincing slightly as tough grasses whipped noisily at the bodywork.

"Why have we stopped?" Selina's neat, smoke-silver head turned in surprise.

"Look at that sign. Let's go up and see what there is. The stuff might be reasonably priced out here."

Selina's voice was pitched high with scorn as she refused, but I was

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too taken with my idea to listen. I had an illogical conviction that doing something extravagant and crazy would set us right again.

"Come on," I said, "the exercise might do us some good. We've been driving too long anyway."

She shrugged in a way that hurt me and got out of the car. We walked up a path made of irregular, packed clay steps nosed with short lengths of sapling. The path curved through trees which clothed the edge of the hill and at its end we found a low farmhouse. Beyond the little stone building tall frames of slow glass gazed out towards the voice-stilling sight of Cruachan's ponderous descent towards the waters of Loch Linnhe. Most of the panes were perfectly transparent but a few were dark, like panels of polished ebony.

As we approached the house through a neat cobbled yard a tall middle-aged man in ash-colored tweeds arose and waved to us. He had been sitting on the low rubble wall which bounded the yard, smoking a pipe and staring towards the house. At the front window of the cottage a young woman in a tangerine dress stood with a small boy in her arms, but she turned disinterestedly and moved out of sight as we drew near.

"Mr. Hagan?" I guessed.

"Correct. Come to see some glass, have you? Well, you've come to the right place." Hagan spoke crisply, with traces of the pure highland which sounds so much like Irish to the unaccustomed ear. He had one of those calmly dismayed faces one finds on elderly road-menders and philosophers.

"Yes," I said. "We're on holiday. We saw your sign."

Selina, who usually has a natural fluency with strangers, said nothing. She was looking towards the now empty window with what I thought was a slightly puzzled expression.

"Up from London, are you? Well, as I said, you've come to the right place—and at the right time, too. My wife and I don't see many people this early in the season."

I laughed. "Does that mean we might be able to buy a little glass without mortgaging our home?"

"Look at that now," Hagan said, smiling helplessly. "I've thrown away any advantage I might have had in the transaction. Rose, that's my wife, says I never learn. Still, let's sit down and talk it over." He pointed at the rubble wall then glanced doubtfully at Selina's immaculate blue skirt. "Wait till I fetch a rug from the house." Hagan limped quickly into the cottage, closing the door behind him.

"Perhaps it wasn't such a marvelous idea to come up here," I whispered to Selina, "but you might at least be pleasant to the man. I think I can smell a bargain."

"Some hope," she said with deliberate coarseness. "Surely even

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you must have noticed that ancient dress his wife is wearing? He won't give much away to strangers."

"Was that his wife?"

"Of course that was his wife."

"Well, well," I said, surprised. "Anyway, try to be civil with him. I don't want to be embarrassed."

Selina snorted, but she smiled whitely when Hagan reappeared and I relaxed a little. Strange how a man can love a woman and yet at the same time pray for her to fall under a train.

Hagan spread a tartan blanket on the wall and we sat down, feeling slightly self-conscious at having been translated from our city-oriented lives into a rural tableau. On the distant slate of the Loch, beyond the watchful frames of slow glass, a slow-moving steamer drew a white line towards the south. The boisterous mountain air seemed almost to invade our lungs, giving us more oxygen than we required.

"Some of the glass farmers around here," Hagan began, "give strangers, such as yourselves, a sales talk about how beautiful the autumn is in this part of Argyll. Or it might be the spring, or the winter. I don't do that—any fool knows that a place which doesn't look right in summer never looks right. What do you say?"

I nodded compliantly.

"I want you just to take a good look out towards Mull, Mr. . . ."

"Garland."

". . . Garland. That's what you're buying if you buy my glass, and it never looks better than it does at this minute. The glass is in perfect phase, none of it is less than ten years thick—and a four-foot window will cost you two hundred pounds."

"Two hundred!" Selina was shocked. "That's as much as they charge at the Scenedow shop in Bond Street."

Hagan smiled patiently, then looked closely at me to see if I knew enough about slow glass to appreciate what he had been saying. His price had been much higher than I had hoped—but *ten years thick!* The cheap glass one found in places like the Vistaplex and Pane-o-rama stores usually consisted of a quarter of an inch of ordinary glass faced with a veneer of slow glass perhaps only ten or twelve months thick.

"You don't understand, darling," I said, already determined to buy. "This glass will last ten years and it's in phase."

"Doesn't that only mean it keeps time?"

Hagan smiled at her again, realizing he had no further necessity to bother with me. "Only, you say! Pardon me, Mrs. Garland, but you don't seem to appreciate the miracle, the genuine honest-to-goodness miracle, of engineering precision needed to produce a piece of glass in phase. When I say the glass is ten years thick it means it takes

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light ten years to pass through it. In effect, each one of those panes is ten light-years thick—more than twice the distance to the nearest star—so a variation in actual thickness of only a millionth of an inch would . . ."

He stopped talking for a moment and sat quietly looking towards the house. I turned my head from the view of the Loch and saw the young woman standing at the window again. Hagan's eyes were filled with a kind of greedy reverence which made me feel uncomfortable and at the same time convinced me Selina had been wrong. In my experience husbands never looked at wives that way, at least, not at their own.

The girl remained in view for a few seconds, dress glowing warmly, then moved back into the room. Suddenly I received a distinct, though inexplicable, impression she was blind. My feeling was that Selina and I were perhaps blundering through an emotional interplay as violent as our own.

"I'm sorry," Hagan continued, "I thought Rose was going to call me for something. Now, where was I, Mrs. Garland? Ten light-years compressed into a quarter of an inch means . . ."

I ceased to listen, partly because I was already sold, partly because I had heard the story of slow glass many times before and had never yet understood the principles involved. An acquaintance with scientific training had once tried to be helpful by telling me to visualize a pane of slow glass as a hologram which did not need coherent light from a laser for the reconstitution of its visual information, and in which every photon of ordinary light passed through a spiral tunnel coiled outside the radius of capture of each atom in the glass. This gem of, to me, incomprehensibility not only told me nothing, it convinced me once again that a mind as nontechnical as mine should concern itself less with causes than effects.

The most important effect, in the eyes of the average individual, was that light took a long time to pass through a sheet of slow glass. A new piece was always jet black because nothing had yet come through, but one could stand the glass beside, say, a woodland lake until the scene emerged, perhaps a year later. If the glass was then removed and installed in a dismal city flat, the flat would—for that year—appear to overlook the woodland lake. During the year it wouldn't be merely a very realistic but still picture—the water would ripple in sunlight, silent animals would come to drink, birds would cross the sky, night would follow day, season would follow season. Until one day, a year later, the beauty held in the subatomic pipelines would be exhausted and the familiar gray cityscape would reappear.

Apart from its stupendous novel-

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ty value, the commercial success of slow glass was founded on the fact that having a scenedow was the exact emotional equivalent of owning land. The meanest cave dweller could look out on misty parks—and who was to say they weren't his? A man who really owns tailored gardens and estates doesn't spend his time proving his ownership by crawling on his ground, feeling, smelling, tasting it. All he receives from the land are light patterns, and with scenedows those patterns could be taken into coal mines, submarines, prison cells.

On several occasions I have tried to write short pieces about the enchanted crystal but, to me, the theme is so ineffably poetic as to be, paradoxically, beyond the reach of poetry—mine at any rate. Besides, the best songs and verse had already been written, with prescient inspiration, by men who had died long before slow glass was discovered. I had no hope of equaling, for example, Moore with his:

Oft in the stilly night,
Ere slumber's chain has bound me,
Fond Memory brings the light,
Of other days around me . . .

It took only a few years for slow glass to develop from a scientific curiosity to a sizable industry. And much to the astonishment of we poets—those of us who remain convinced that beauty lives though lilies die—the trappings of that industry were no different from those of any other. There were good scenedows which cost a lot of money, and there were inferior scenedows which cost rather less. The thickness, measured in years, was an important factor in the cost but there was also the question of *actual* thickness, or phase.

Even with the most sophisticated engineering techniques available thickness control was something of a hit-and-miss affair. A coarse discrepancy could mean that a pane intended to be five years thick might be five and a half, so that light which entered in summer emerged in winter; a fine discrepancy could mean that noon sunshine emerged at midnight. These incompatibilities had their peculiar charm—many night workers, for example, liked having their own private time zones—but, in general, it cost more to buy scenedows which kept closely in step with real time.

Selina still looked unconvinced when Hagan had finished speaking. She shook her head almost imperceptibly and I knew he had been using the wrong approach. Quite suddenly the pewter helmet of her hair was disturbed by a cool gust of wind, and huge clean tumbling drops of rain began to spang round us from an almost cloudless sky.

"I'll give you a check now," I said abruptly, and saw Selina's green eyes triangulate angrily on my face. "You can arrange delivery?"

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"Aye, delivery's no problem," Hagan said, getting to his feet. "But wouldn't you rather take the glass with you?"

"Well, yes—if you don't mind." I was shamed by his readiness to trust my scrip.

"I'll unclip a pane for you. Wait here. It won't take long to slip it into a carrying frame." Hagan limped down the slope towards the seriate windows, through some of which the view towards Linnhe was sunny, while others were cloudy and a few pure black.

Selina drew the collar of her blouse closed at her throat. "The least he could have done was invite us inside. There can't be so many fools passing through that he can afford to neglect them."

I tried to ignore the insult and concentrated on writing the check. One of the outsize drops broke across my knuckles, splattering the pink paper.

"All right," I said, "let's move in under the eaves till he gets back." You worm, I thought as I felt the whole thing go completely wrong. I just had to be a fool to marry you. A prize fool, a fool's fool—and now that you've trapped part of me inside you I'll never ever, never ever, *never ever* get away.

Feeling my stomach clench itself painfully, I ran behind Selina to the side of the cottage. Beyond the window the neat living room, with its coal fire, was empty but the child's toys were scattered on the floor. Alphabet blocks and a wheelbarrow the exact color of freshly pared carrots. As I stared in, the boy came running from the other room and began kicking the blocks. He didn't notice me. A few moments later the young woman entered the room and lifted him, laughing easily and whole-heartedly as she swung the boy under her arm. She came to the window as she had done earlier. I smiled self-consciously, but neither she nor the child responded.

My forehead prickled icily. *Could they both be blind?* I sidled away.

Selina gave a little scream and I spun towards her.

"The rug!" she said. "It's getting soaked."

She ran across the yard in the rain, snatched the reddish square from the dappling wall and ran back, towards the cottage door. Something heaved convulsively in my subconscious.

"Selina," I shouted. "Don't open it!"

But I was too late. She had pushed open the latched wooden door and was standing, hand over mouth, looking into the cottage. I moved close to her and took the rug from her unresisting fingers.

As I was closing the door I let my eyes traverse the cottage's interior. The neat living room in which I had just seen the woman and child was, in reality, a sickening clutter of shabby furniture, old newspapers,

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cast-off clothing and smeared dishes. It was damp, stinking and utterly deserted. The only object I recognized from my view through the window was the little wheelbarrow, paintless and broken.

I latched the door firmly and ordered myself to forget what I had seen. Some men who live alone are good housekeepers; others just don't know how.

Selina's face was white. "I don't understand. I don't understand it."

"Slow glass works both ways," I said gently. "Light passes out of a house, as well as in."

"You mean . . . ?"

"I don't know. It isn't our business. Now steady up—Hagan's coming back with our glass." The churning in my stomach was beginning to subside.

Hagan came into the yard carrying an oblong, plastic-covered frame. I held the check out to him, but he was staring at Selina's face. He seemed to know immediately that our uncomprehending fingers had rummaged through his soul. Selina avoided his gaze. She was old and ill-looking, and her eyes stared determinedly towards the nearing horizon.

"I'll take the rug from you, Mr. Garland," Hagan finally said. "You shouldn't have troubled yourself over it."

"No trouble. Here's the check."

"Thank you." He was still looking at Selina with a strange kind of supplication. "It's been a pleasure to do business with you."

"The pleasure was mine," I said with equal, senseless formality. I picked up the heavy frame and guided Selina towards the path which led to the road. Just as we reached the head of the now slippery steps Hagan spoke again.

"Mr. Garland!"

I turned unwillingly.

"It wasn't my fault," he said steadily. "A hit-and-run driver got them both, down on the Oban road six years ago. My boy was only seven when it happened. I'm entitled to keep something."

I nodded wordlessly and moved down the path, holding my wife close to me, treasuring the feel of her arms locked around me. At the bend I looked back through the rain and saw Hagan sitting with squared shoulders on the wall where we had first seen him.

He was looking at the house, but I was unable to tell if there was anyone at the window. ■

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in science-fiction!—about a "counter-insurgency" problem that's an ultimate dilly! How do you control the local boys on an alien planet, when said localites are dedicated to stealing your weapons, and killing you because you're sort of in the way—and are natural-born teleports? How can you keep teleports from stealing you blind, deaf, dumb —and dead? ■ The Editor.

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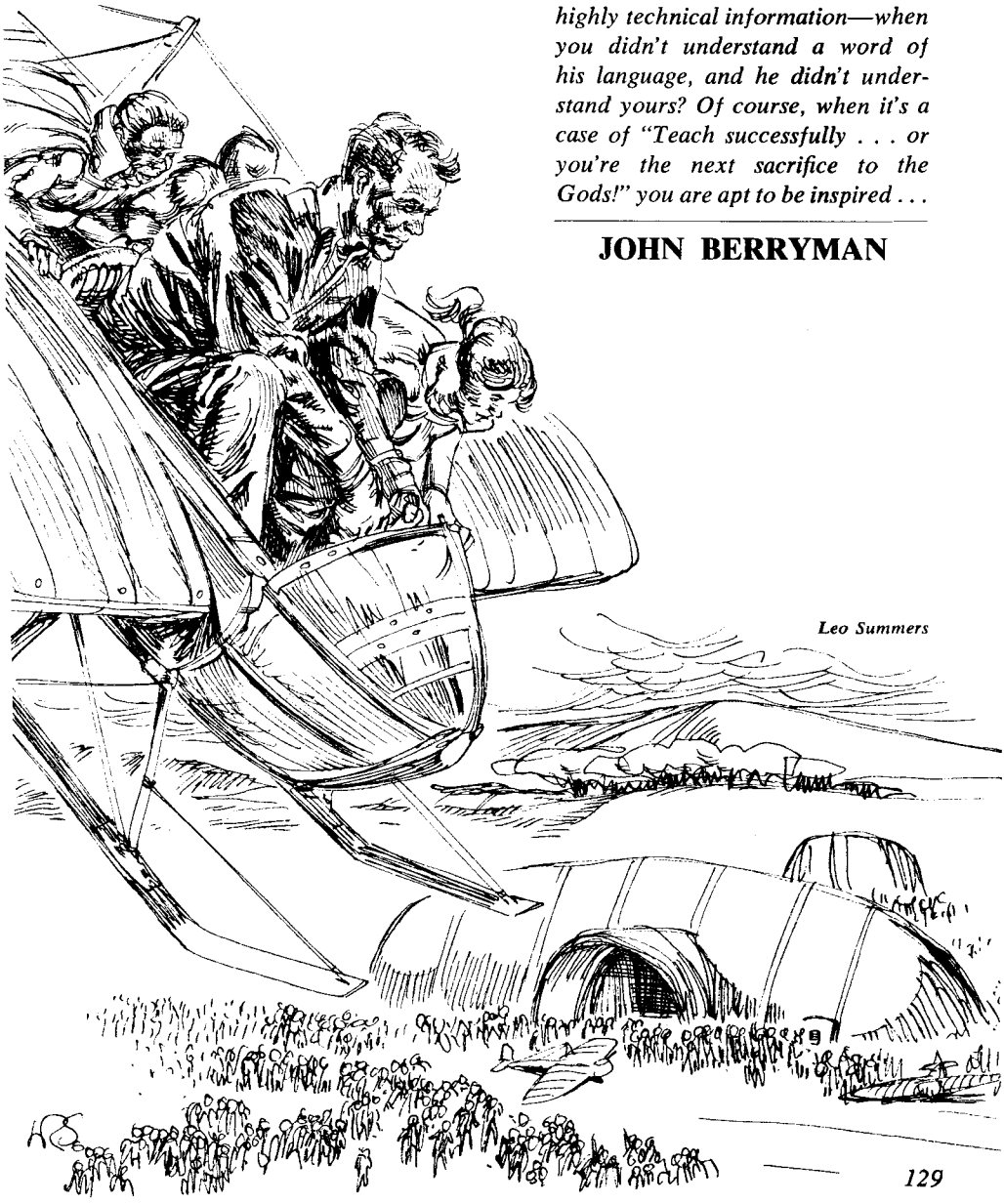
SOMETHING TO SAY

Ever try to teach somebody some highly technical information—when you didn't understand a word of his language, and he didn't understand yours? Of course, when it's a case of "Teach successfully . . . or you're the next sacrifice to the Gods!" you are apt to be inspired . . .

JOHN BERRYMAN



Leo Summers

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I

"Fore!"

We all looked up from the subdued chatter around the breakfast tables. It was the chief's voice, hooting hollowly down the twenty-meter tube linking the Mess bubble with the Administration bubble.

There was an expectant pause at the tables. The chief seldom joined the flight crews at Mess. When he got no answer to his hail, Dr. Bellingrath dove through the tube. He came flying with lunar slowness into our bubble, hands outstretched to brake with the shock cord. The moment he got his big bulk righted and put his feet down on the floor, he began speaking rather loudly, so that all of us laid down our pushers and covered our low-G breakfast bowls.

"I'm changing assignments for this watch, gentlemen," he said in a no-nonsense tone. "Reamy," he went on, looking over at me. "I want you to fly the first one. Come to my office, will you, please?"

He started back to the tube entrance. John Yousoufian stopped him:

"Wait a minute, Chief," he said, rising carefully to his feet in the low gravity. "I drew this mission!"

Bellingrath faced Yousoufian. "I know you did, Yousoufian," he growled. "But I changed it."

"I don't like that!" Yousoufian protested. "We should fly our regular turns."

"Right," the chief agreed. "Unless I decide otherwise. You'll just have to dislike it. Reamy," he said, returning to me, "as soon as you can make it!"

"Yes, sir," I said, deciding it would be too unpleasant to stay at Mess. I stood up with the same care John Yousoufian had used. Six Beta is a tiny moon, and it's easy to fly off your feet if you move quickly, or don't keep a grip on something solid.

Bellingrath hollered "Fore!" down the tube leading to his office, put his feet in the starting blocks, leaned slowly forward in the weak pull of Six Beta's gravity, and dove with elephantine grace into the entrance. I followed him, leaving a pretty loud buzz of conjecture in the Mess behind me.

The chief didn't bother to sit behind his desk in the ten-meter bubble that was his office. He was propped against its corner when I slowed my dive on his shock cord and pulled myself erect.

I beat him to the punch. "What did I do to deserve this, Chief?" I demanded.

"Deserve what, L.C.?" he shot back.

"You know the other pilots are going to be sore about this," I told him. "They are just as interested in flight pay as I am. They'll take it out on me because you gave me this extra junket."

"Perhaps," he conceded, beginning to strip the wrapper off his

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morning cigar. "But that's minor compared to the problem I'm solving by having you take this flight to Six." He looked up from his work with the stogey. "Can't you figure what's gone wrong, L.C.?"

I shook my head.

"One Bloc or the other is getting desperate," he said bitterly. He paused to light his smoke. "Somebody made an illegal landing during the last watch."

"On Carina VI?" I asked, startled.

"No. Here on Six Beta. Oh, it's plain enough what's on their mind. Whether it's the Dembloc or the Sovbloc I don't know, but one Bloc has decided the only way to get preference on Six is to land some contrabands on the planet before the Federation opens it up under the Treaty. With only a standard month left before we make our first landing, they have very little time. Obviously they can't land a deep-space vehicle there without a grid, so they've got the hot idea of stealing one of our atmospheric probes."

"You mean, hijack one of our search vehicles, Chief?"

"Why not? We're wide open to that kind of attack. Well, I'm in charge of keeping this Mission neutral. No terrestrials are going to land on Six until a month from now, when the Treaty interval has elapsed! Now do you know why I want you to fly this mission?"

I did, but I shrugged.

"The devil you don't, L.C.," he growled, impatient with me. "You're the nearest thing we've got to a neutral. You're the only pilot here on Beta who wasn't born on Earth. Every other man was raised under either the Sovbloc or the Dembloc. Oh, they're supposed to be neutral, I know. But who stops rooting for the home team? Since I can't tell which Bloc landed the hijackers here on Beta, I'll play safe by putting a neutral at the controls of this mission. And if we haven't rounded up the bandits before the next mission, we'll suspend flights and deactivate all our equipment until the bandits run out of air and we can pin them. All right?"

I shrugged again. "I'm neutral," I said. "If that means anything. But you know I'm not going to put up a fight if some bandits come after my vehicle with lasguns."

"That is a hitch," he agreed. "I know you have the right, as a Non-violent Pacifist, to refuse to carry a sidearm, but I hoped you wouldn't insist on it."

I had to shake my head. "I'm sorry, Chief. I am committed to non-violence."

"Then you can't go alone; somebody will have to ride shotgun for you, that's all," Bellingrath said. "Whom would you like?"

"Well," I said, frowning. "John Yousoufian would be best. This was supposed to be his mission, Chief, and this way he'll get his flight pay."

Bellingrath shook his head. "He's Sovbloc," he said slowly. "Nothing

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doing, L.C. Pick a man from the Dembloc."

So that was how the wind blew. "I thought you said you didn't know which Bloc had put the bandits down on this moon," I protested.

"That's what I said," he admitted. "I don't *know* which Bloc has decided to go for broke. But I've got some pretty good ideas. The Federation has its own intelligence service, you know."

"O.K.," I said. "Then I'll ask for Eddie Foyt. He's a tough enough Irishman to be willing to do your shooting for you."

"I'll settle for Foyt," the chief said. "Here," he said, straightening up to walk around his desk and open a drawer. He handed me a lasgun in a holster. "Give this to Eddie."

II

A couple hours later Eddie Foyt and I sat silently side by side in our vehicle, waiting for Beta to turn enough on its axis to bring us to our launch window. Eddie had boarded first to handle the countdown, and all indicators on the panel showed green. We had nothing to do until the booster gave us a gentle kick in the pants and started us on the S-orbit that would let us make a grazing entrance into the immensely deep atmosphere of Six. The moment of pause turned my thoughts back to the situation we found ourselves in.

From the moment the flash went around the Galaxy that Carina VI had an intelligent population, the Federation had gone into action. Six was declared off-limits to all humans. A long-prepared expedition set out to assure that this new planet of intelligence would enter the family of planets in proper form.

Our Federation advance party had set up its survey base on Beta, the small second moon of Carina VI. Under the Treaty, we Federation technicians had a full standard year to study the newly discovered intelligent race from space. Only a month now remained of that standard year of survey. And once it had elapsed, the Federation had the right for still another standard year to control all contacts between the natives of Six and representatives from both Blocs. The chief's reassignment of Foyt and me to our present mission was because of an attempt to circumvent the Treaty.

Foyt and I had drawn what was my tenth or twelfth deep penetration of Six's enormous atmosphere. We were scheduled to tow behind our aircraft a drogue with several kinds of magnetometers in it. In common with most of our atmospheric searches, it was to be conducted on the dark side of Six, and so scheduled that the short blast of rocket-fire needed to get us back out of the atmosphere would readily pass for meteoric activity.

Eddie had continued to sit silently in the dimly-lit control room,

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hunched down beside me in his spacesuit from the moment of our unhurried blast-off from Six Beta. Only when I called off our course co-ordinates did his grunted "Check!" sound in my earphones.

I shrugged mentally and concentrated on the lighted instruments, timing our retroblast so that we would make a correctly grazing entry to Six's deep atmosphere. Just as I felt for the toggle, there was a rap on my helmet. The bottom fell out of my stomach. Eddie and I were supposed to be alone on our vehicle.

I held absolutely still. From the corner of my eye I could see the instruments' lighted dials mirrored on Foyt's helmet react as a similar rap warned him to freeze.

A gauntlet reached down beside me in the dark and pressed the release stud on my chair. I felt it swung around. I could see Eddie's chair turning, too. Then we were looking into the lasguns held by the two spacesuited figures sharing the dimness of our control room. Barely visible Cyrillic letters, stenciled on their chest plates, said they were Frol Balienkov and D.D. Stiffler. Sovbloc bandits, just as Bellingrath had guessed.

Balienkov made the gesture that means "take it off." Eddie was first, moving carefully out of his chair in the zero-gravity, and splitting his suit down the seal so that he could squeeze out of it. Balienkov oozed forward, lasgun at the ready, felt for Eddie's gun and took it from its suit holster.

A jerk of the muzzle of Balienkov's lasgun told me it was my turn next. I repeated Foyt's movements and slid from my suit like a molting crayfish.

At a gesture from Balienkov, his sidekick Stiffler moved forward, obviously searching for my lasgun.

I shook my head. "No gun," I said in English. I saw no point to giving away the fact that I spoke Russian. Both the Sovbloc bandits looked over at Eddie, twisting their heads inside the shiny bubbles of their helmets. The gleaming plastic sharply mirrored the console now behind me.

"That's right," Foyt said. "L.C. is a Nonviolent Pacifist."

"But you aren't," I said bitterly to him. "You were riding shotgun, weren't you?"

"I had no choice, L.C.," Foyt started to tell me, when I noticed that Balienkov had begun his molt. Stiffler kept us well covered as the apparent Sovbloc boss got rid of his suit. He retrieved his lasgun, and Stiffler molted.

"What do you mean, no choice, Eddie?" I said. "You must have known since you boarded that these bandits were on board."

"Yeah," he said dispiritedly. "They were laying for me."

"He is right," Stiffler said sharply, causing me to look around. The voice had the wrong timbre. D.D.

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Stiffler was a woman. You can't help it. You look at them as females. So I looked at her. Dim as it was, I could see that she was quite tall, although slender. I doubted she weighed fifty kilos. Her face had a chill Nordic kind of beauty, but it was frozen with the intensity of her concentration on what she was doing. I wished there were more light in the control room.

"Mr. Foyt has been injected with a synthetic virus of Sovbloc manufacture, Mr. Reamy," Stiffler said in nearly accentless English from the near-dark. "His behavior must be understood in terms of the fact that he will not receive an immunizing injection unless he follows our orders."

I shrugged. What I might have done under the same circumstances I had no way of knowing. "Sorry I spoke as I did, Eddie," I told my co-pilot.

"Sure, L.C.," he said. "Now what, Balienkov?"

"We make entry into the atmosphere of Six," the Sovbloc agent said. "Who will be in charge? Will you follow our directions, Reamy, or must we rely on the control we have over your co-pilot?"

"I'll take us in," I said. "What do you want, anyway?"

He grinned at me. "Miss Stiffler and I shall use parachutes to land on the surface, Mr. Reamy. We shall first disable the rockets of your vehicle so that it must crash on the surface of Six. We count on your loyalty to the Federation to force you to bail out near it so that you may destroy the wreckage before the natives can locate it and ponder on its significance, eh?"

"We will do that," I said.

"Then start entry as soon as we cross the terminator," Balienkov ordered, swinging my chair back to the control console. I could hear him and his female partner drawing their safety belts tight in the reserve crew seats behind us.

"Fortunately," I could hear Balienkov say from over my shoulder; "a number of the members of your Federation mission on Six Beta are loyal to their Sovbloc heritage and have kept us informed of the data you have dredged up from this newly-found planet of intelligence. Diane and I are linguists assigned to establish immediate contact for the Sovbloc with the ruling circles of Six. It was good to learn from your tapes that the indigenes use a vocal form of communication in our audible range."

I fired the retroblast and soon we were pressed hard into our seats as the deep atmosphere of Six tugged at us on our grazing entry. Because our velocity was not much more than it took to break away from the attraction of the tiny second moon of Six, we entered comparatively slowly, and the deceleration of atmospheric friction had us down to gliding speeds over the dark side of the planet within a few minutes.

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Our delta-winged vehicle was capable of excellent gliding flight at Mach 3. I held her nose down and kept the Mach indicator hovering around that figure, trying to stretch our glide around to the sunlit side.

"Enough of that, Reamy," Balienkov said from behind me, tapping me on the shoulder with his lasgun. "Slow us down, Pacifist. We want to drop lower, down to where we have about one-quarter standard atmospheric pressure. And we want to stay in the dark. Diane and I will bail out when pressure hits about half a gram per square centimeter, eh?"

"Why not?" I said, raising the nose slowly and beginning to kill the speed of our big kite.

"Hey!" Foyt cried. "When do I get my immunity shot?" He swung his chair away from the console to face the armed Sovbloc agents behind us.

"Just a moment," Balienkov said, grunting. I peered around momentarily to see him tearing out a whole bank of wiring that controlled our rockets. When he was done, we were without the power to blast back into space, and our vehicle was condemned to crashing on the dark surface of Six.

Then he spoke to Foyt. "You fool," he said with relish as I concentrated on dropping our kite lower and lower into the deep atmosphere of Six. "Did you really think I would be so incautious as to bring the antidote with me, where you might be able to get it by subterfuge or stratagem? Certainly not."

"Watch it, Eddie," I said quietly from the controls, seeing my copilot's muscles tense. "How do you know he really pumped any synthovirus into you?"

"I checked with the med-pack, L.C.," Eddie said furiously. "He gave me the real jolt, all right!"

"Frol!" It was Diane Stiffler's turn to show emotion. The female linguist began spitting Russian at her Sovbloc companion. "You said you would give him the immunizing injection! This is not right! Not fair!"

"Quiet!" Balienkov snapped at her in the same tongue.

"Murder!" she stormed at him. "I will not countenance . . .!"

I could almost feel him swing his gun toward her. "Yes, you will!" Balienkov said. "I am in command here! Follow my orders!"

She subsided. But Eddie did not. He launched himself from his contour-chair straight at Frol Balienkov behind me. The flash of the lasgun was like a bolt of lightning. The laser beam smoked hotly against the upholstery of Eddie's seat. I knew the bolt had passed clean through Eddie's body. The control room stunk of burnt flesh.

"To let you know we mean business, Mr. Reamy!" Balienkov said behind me, his accent now a little thicker. "What is our pressure?"

"Two-tenths of a gram," I said, gritting my teeth. "You said half a gram. We have a few minutes."

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"Time to get into our chutes," Balienkov told Stiffler in Russian. I could hear them moving around. And then he was standing behind me. "I will go first," I could hear him telling the girl. "Wait about a minute, and then follow me. That should assure that we will land some miles apart. We can't judge the initial hostility of our reception, and by landing separately, we increase the chance that one of us will survive. After a standard day, work in my direction, and I will move in yours. Shoot this Pacifist if he so much as sneezes."

"Yes, sir," she said in surly obedience.

The lasgun barrel tapped my shoulder again. "Slow down close to stalling, Mr. Reamy," Balienkov said. "Open the escape hatch."

I touched the control and the big kite buffeted as the hatch-screen dropped open, flooding the control room with wild drafts and a lot of racket. "See you later!" I heard Balienkov yell.

A quick turn of my head assured me that he had dropped free and, if his chute had opened, was dangling beneath it as it dropped slowly through the darkness into the deep atmosphere of Six.

I closed the hatch screen.

"Open up!" Stiffler said edgily behind me. "I am jumping!"

"Don't," I said. "You'd be dead before you reached the ground."

"What!"

"Sit down in Eddie's chair," I said to her pointing to the seat beside me. "You've been tricked. Balienkov will be dead in another minute."

"Dead?" she demanded, taking the other seat, her lasgun covering me. "How?"

"Anoxemia," I told Diane Stiffler. "This is one tremendously deep atmosphere. At the surface, pressures are about six times standard. But the oxygen percentage is only one sixth of standard. While that makes it breathable *on the surface,* way up here, at a quarter standard pressure, there isn't enough equivalent oxygen to keep a flea alive."

"You knew that!"

"Sure."

"And you let Frol leap?"

"Why not?" I asked, heading our kite deeper into the dense sea of pitch-black air around us. "He killed Eddie, didn't he?"

"And you, a Pacifist!" she seethed. "Sworn to avoid violence!"

I grinned across at her in the dim light of the control room. "I never lifted a finger, Miss Stiffler," I said. "That's one thing you mustn't forget about Pacifists. We have learned to compensate for not being able to bring force to bear."

"You are a liar," she decided. "Open that hatch. I saw the transcripts of the reports made to the Federation. There is plenty of oxygen!"

"Faked," I said. "We know more about what's going on than you might expect. Do you think it was

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pure coincidence that there were no pilots of Sovbloc parentage scheduled for the missions this watch? Obviously the chief knew it was a Sovbloc ship that grounded on Six last watch. Your man, Yousoufian, tried to fly with me, but the chief nixed it. And if we know that much, perhaps we know your other agents, eh?"

"I'll bail out at three grams pressure," she said tightly. "That will make up for the one-sixth-as-much oxygen concentration."

"If *that* figure was the truth," I reminded her. "You had better ride this kite all the way down with me. I think I may need an interpreter."

"No!" she said. "You are a Federation man. I would never help you!"

"You don't care *how* you die, do you?" I said, hauling back on the yoke angrily and stalling the big kite completely. A delta-wing isn't meant for aerobatics. We fell off into a flat spin at once. In about three turns our radial velocity had built up to the point where both Diane Stiffler and I were pressed helplessly into our chairs. She didn't bother to raise her lasgun to shoot. She was too dizzy to so much as see me.

The spin down into the darkness seemed endless. It only seemed that way. All things come to an end.

III

We endured a series of messy tearing thumps in the last minute or two before we struck the surface. I don't know what kind of a crash D. D. Stiffler expected, but in that soupy six-times-standard atmosphere, our final descent velocity was picayune. Still, the sudden end to our spinning gave as violent a wrench to our senses, inside the pale illumination of the control room, as the onset of the whirl had done in the first place.

In the long minutes of the spin to the surface I had done some thinking. In spite of a vertigo surpassing anything they had ever induced during space training, I crawled the short distance over to where Stiffler was trying to stop her retching in Eddie's chair, and found her lasgun. One thing about the weapon, it is easy to break. A sharp rap on any hard surface shatters the crystal, and then it is just so much junk. As my head cleared, I looked around for Eddie's weapon, but on not finding it decided that the dead Balienkov had it with him. The Sovbloc agent was still, of course, many kilometers high in the enormous atmosphere of Six.

The retching beside me came to an end. "Some merry-go-round," I said to Diane in the dark. She swore at me in Russian. My knowledge of the language was not that colloquial. "Same to you, kid," I said, resisting a shameful impulse to smack her on the top of the head.

By then I was making my way out of the control room into the darkness of night outdoors, and letting

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myself cautiously down to the surface. It was firm underfoot, and felt somewhat springy, as though I had stepped on dried vegetation. The night was soundless, and the heavy air moved sluggishly against my cheeks.

A quick look into the black vault of the heavens at the position of Six's two moons revealed that we had crashed close to the dawn line, and that Carina soon would climb up over the horizon. Diane did not fight me when I came back and insisted she leave our wrecked ship. I made the routine arrangements for its destruction, set the time-fuse and led the girl slowly away by the arm. A decent cremation was the best I could do for Eddie Foyt.

"Don't you have a light, Reamy?" Diane said testily, feeling ahead of her in a fumbling fashion with first one foot and then the other.

"Federation rules permit nothing in our possession more advanced than already developed on Six," I said. "You know that. Come on, that rocket fuel gets hot when it burns."

"You are destroying the ship!" she cried. "There is food there, and medicine!"

"And a radio, and all sorts of goodies," I said. "Nothing doing."

A burst of light from behind us, growing rapidly in brightness, showed that we could walk forward quite safely. We were in a meadow or bracken, depending on how big you considered Sixian vegetation got. The ferns were nowhere more than knee-high. Our long shadows showed that the ground stretched levelly away from us for hundreds of meters, lit by the burning magnesium behind us. I was sure that the heat of the rocket fuel would be sufficient to vaporize any of the more refractory metals used in the construction of our search vehicle.

We had managed to walk a kilometer or more away from our craft by the time the light of its fire receded. Our eyes, somewhat tricked by that brightness, had failed to note the paling of the East, and Carina came redly above the horizon more quickly than I had expected. Six had a fairly rapid rotation.

The light of the sun produced prompt activity on all sides. In the first place, the silence of the dark gave way to a welter of small, sharp sounds, apparently underfoot. Had I not known better, I would have sworn all manner of mice were squeaking and scuttling through the ferns around us.

The noises, however, were made by flying animals, who were flapping and chattering on all sides as they ran through the bracken before taking to the thick air in the first flush of dawn. As if at a signal they burst from the ground like a covey of quail.

They were headed up. And above us, I suddenly realized, lay the forest. In the thick air, perhaps a couple thousand meters high, floated

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amorphous shapes, apparently equally made of large bladders, nearly transparent in the morning light, and fibrous strands holding them together. There was a good deal of greenery strung around the strands. They obviously had been the source of the rending thumps shortly before we crashed.

"What are they?" Diane demanded, pointing up.

"Flying trees, I guess," I said. "With this thick an atmosphere, a lot of things are possible. I'm guessing that by some inverted photosynthesis those plants separate hydrogen from water and secrete it in those great big bladders. As the sun comes up and they heat, I imagine they climb to some pretty respectable heights."

Already the race between the thermal climbing of the airborne trees and the flapping zoom of the flying animals was in force. The "birds" that had left the ground as soon as there was a little light flapped upward strongly in flocks, and soon fell to attacking the bladders that were supporting one of the "trees." Pierced and leaking, it began to sag and settle, while its companions in the forest, their bladders now well-warmed by hot-house effect, were climbing up into the dimness and glare above us.

The climbing disappearance of the trees focused our attention on a number of larger flying creatures. These were plainly many times the size of the flapping animals that had attacked the flying tree, and they soared on the morning thermal currents. Occasionally we could see a lazy, deliberate flap of a stubby wing as one of these birds worked across from one thermal to another.

As the sun continued to climb, a search of the horizon showed a column of smoke rising fairly straight and thick above the remains of our vehicle. Even though the smoke was better than a kilometer from us, we could see a flock of still larger soaring creatures circling it, like so many stubby-winged buzzards. And then the flock peeled off and began to soar in our direction.

"Down, Diane," I said. "Here come those big buzzards. I don't know how big they are. If they go for us the way the flappers went for that tree, we've had it."

She was quick enough to throw herself belly down among the ferns, but she was female enough to stick her head up to see what was happening. This time I gave in to the impulse and rapped her sharply over the noggin, getting more Russian profanity for my trouble.

A shadow sped over us, and then a series of them. Rolling onto my back I saw that a couple dozen of the soaring creatures had made a pass over our position in the bracken, and were turning tightly to head up-wind and land near us.

"For pity's sake!" I said, getting a good look at the last of the soarers. "Those are machines, not creatures! Look!"

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We both sat up. Oh, the creature was there, all right. There was a pilot in each of the soaring things, sitting, lying, or standing, I had no way of knowing, in an open cockpit. He was steering his glider with what appeared to be two hands, and his upper end—if that's what we were looking at—was shockingly human.

Bird-like, or airplane-like, the stubby-winged gliders made a series of rough, slipping turns in a pattern and prepared to land single-file forty or fifty meters from where we sat in the bracken. As they flared out "over the fence" they wobbled in near-stalls, accentuated by the extremely low aspect ratio of their wings. At the comical last moment, the "landing gear" was extended. Just two of the most human-looking legs and feet you ever saw. Each pilot trotted a few steps and squatted down, grounding his glider.

As quickly as they landed, the pilots hopped from their machines and came running toward us. The first one to land made straight for me.

There is a lot of romantic nonsense about the first contact between intelligent populations. This native had a perfectly straightforward idea of how it was to be handled. He never stopped running. Just charged straight into me, bowling me over again, and sat on me. By the time I had started to struggle, enough of his friends had been added to the pile to make the struggle pointless. I could hear Diane gasping and crying out as she got the same treatment.

Her cries, however, had a nonhuman weirdness about them. I realized that the tapes which our disguised sound probes had yielded us had been smuggled far too effectively to the Sovbloc. Diane had some idea of how the Sixian language was constructed, and she was doing her best to produce the right sounds.

The scuffle subsided, and our captors started a considerable chatter.

In a few moments they let me sit up. Diane was already on her feet,

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facing one of the natives, considerably smaller than she was, but not so much smaller that he could not watch her lips and tongue closely as she rattled off some of the darnedest sounding lingo you ever heard.

I suppose the humanoid gesture of surprise is the same all over the Galaxy. These little characters were humanoid to about eight places. Outside of weighing, I suppose, no more than twenty-five or thirty kilos, and being no more than a hundred and twenty centimeters tall, they could have passed for some kind of humanity. Certainly nature had supplied eyes, ears, nose, mouth, fingers and toes in the human position and quantity.

Diane walked slowly over to my side. "Good-bye, L. C. Reamy," she said. "Too bad you aren't a linguist!"

"We should stick together, Diane," I told her. "I can't talk this stuff. They may chop my head off!"

"Too bad," she said. "If I get their drift, they are arguing over whether to kill you now or save you for a big sacrifice scene a little later. And as a Pacifist, you won't even be able to resist!"

Leaving me considerably shaken, she walked with a group of the little sky-jockeys to the largest of the gliders that rested on the bracken. Apparently it was a two or three passenger affair. With considerable care, they helped her aboard what was plainly a thing of frightening fragility.

From somewhere the gang came up with a long strand of some stretchy material, rubber or a similar natural co-polymer. Hitching it to a kind of hook on the nose of the large glider, a dozen or so of the jockeys ran forward to stretch the launch cord to the limit of its elasticity. At a cry, the big glider began

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to ooze forward, gathering speed only slowly. But at a ground speed of no more than two or three meters a second, it was airborne, and climbed until it passed over our heads a good five meters high, dropping at that moment the launch cord.

Already the big rig was banking, slipping toward the inside of the bank as it did, but getting around in a hitching, irregular turn as it sought to stay within the rising column of air in the first thermal it caught.

I was prepared to be taken away in the same fashion, and walked over to the grounded fleet of gliders, a flock of jockeys chattering and tagging along with me. On reaching it, I was quite suddenly knocked down again, and a squad of the jockeys surrounded me, picking me up like so many pallbearers. In a moment I realized that they were weighing me. The decision was quite plain. I was too heavy for any of the craft on the ground. After what looked like a request for volunteers, one of the small stubby-winged gliders was shot into the air by the long stretchy cord, and passed quickly away to the West, obviously hurrying rapidly from thermal to thermal.

I sat down for a wait.

IV

The sky-jockeys of Six didn't have the same idea. Several of them grouped around where I had planted my fundament amid the ferns. They wanted to talk. Diane's example explained their interest. They tried it slow. They tried it fast. They tried it loud. They tried it with elaborately exaggerated motions of their lips and tongues.

All I could do was grin at them and shake my head. *"No capish,"* I said. "I don't dig that jive, cat."

The shrug that my chief interrogator gave was human enough to be funny. I took a more careful look at him. He was dressed in a kind of cape or cloak of pale yellow that fit rather tightly about the neck and hung stiffly down almost to his ankles. So, I discovered on looking around, were the other jockeys. There was some variation in color, ranging from fawn to brown. The capes were all open down the front, which enabled me with no imagination at all to discover that about half of my captors were male and about half female.

From time to time my captors, for such I had to consider them, took a gander at Carina, plainly checking the passage of time. Their initial tension began to relax after half a standard hour or so. Two of the jockeys were launched by the crew on the ground, and others showed interest in leaving. Feeling my time was drawing short, if I wanted to improve on my status, I gestured trying to get across the idea that I wanted to walk around.

This called for more chatter, and started what I took to be an

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argument. A brown-caped jockey seemed pretty interested in keeping me off my feet. Somehow he got outvoted, but his sharp tones showed that he wasn't taking his licking lying down. When one of the other jockeys gave a show of assent, I got slowly to my feet. Quite plainly they didn't like my size, for they backed off a few paces from me as I moved slowly over to where their fleet of gliders was drawn up.

I stopped a few meters short of the nearest glider and studied it, with the brown-caped objector hopping up and down in protest.

The vehicle was a prize example of what environment can do for the most primitive of people. Without a trace of a piece of metal in it, and made, I later found out, solely of vegetable products requiring very little processing to adapt them to this use, it was as fragile as a chambered nautilus and as light as thistledown. Its frame was a kind of rattan or bamboo. Its wing and tail covering, I later discovered, was made from the bladder skins taken from the flying trees, and dyed a light gray.

As a flying machine, however, it was just plain horrible. Nothing but an atmosphere of great density, proper natural materials and relatively small humanoid stock made flight possible with the equipment. First off, the single-surfaced wings were deeply cambered. This would give good lift characteristics at low speeds, of course, a necessity with their method of shooting a landing on their own feet, but the heavy camber also assured high drag at any speed, which limited velocity considerably.

The wing, moreover, had a comically low aspect ratio. Span was not even twice the root chord, and, although the whole wing was roughly elliptical in shape, the low aspect ratio assured big tip losses and instability at high angles of attack, which I had noticed when the jockeys were nosing up as they slowed to land.

Walking over closer, to the tune of still shriller objections from brown-cape, I tried to get a quick idea about how the controls worked. They appeared to be only two in number, both operated by hand by the pilot, who straddled a kind of wicker saddle just forward of the wing. His feet rested in stirrups, below which were twin openings which enabled the jockey to extend his legs when landing.

Each control was a simple lever of some woodlike material, pivoted at one end, to which some thin fibers or strings were lashed. In turn the strings ran over grooved blocks of a harder appearance, which served as pulleys, to their force-points. The left-hand lever, as far as I could figure out, warped the rear of the stabilizer so as to make it act as an elevator. Apparently the right-hand lever enabled the jockey to warp the stubby wings, and served as aileron control.

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Well, I reflected, wing-warping was good enough for Wilbur and Orville, and it was certainly good enough for a Bronze Age population on Carina Six, a population that seemed to find the air as much its natural habitat as the Cro-magnon human had found the surface of the sea.

There was a vertical fin of sorts making up the remainder of the empennage, but I could see no method of moving it from side to side. In other words, there was no rudder.

Now I could understand the rough slipping turns I had seen the jockeys make as they had swung around into the wind to land near Diane and me. I began to get a glimmer of hope. While I had a primary obligation to make sure the Sovbloc contraband did not tinker with the humanoid population of Six until the Treaty interval had elapsed, I figured I had a still more important obligation to keep alive in order to achieve my purpose. And the way things were shaping up, I felt I had better start to score some points with these people.

Turning to one of the less hostile jockeys who had followed me, I pointed to the strings they used for control cables and tried to show that I wanted some. That was the signal for brown-cape to burst into a wild harangue. He thumped his chest and made quite a speech of it. Funny, I could see that he was getting across to the other jockeys. Quite without visible signal, they jumped me, knocked me down and carried me a good fifty meters away from the nearest glider. My questions had got too close to the bone. So I had lost round one.

The climb of Carina to the zenith was swift, by comparison with a standard day. The forenoon passed with me sitting, painfully aware that the jockeys did not want me to move around. I was getting hungry, but whatever the diurnal pattern of my captors was, it did not appear to include food. As the sun started its downward slant, more and more time was spent studying the soupy glare of the sky: I had a pretty good idea what the little characters were seeking. And then, when irritated scowls aimed at the bracken had taken the place of their searches of the heavens, we heard a call from above us. The jockeys all jumped up, waving to a good-deal larger glider that was making the usual sloppy rudderless turns as it came drooping down from the thermal-active late afternoon air to our little covey.

The grayish-black machine swam sluggishly into the wind and oozed into a landing near at hand. Four sets of legs came out together as it grounded. Here, then, was a glider with enough lift to drag me with it, presumably in the same direction they had taken Diane. I hoped so. Unless I got to her soon, she'd be so far ahead of me with her linguistic

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skill that I wouldn't be able to head her off. And I still had to figure a way to compete with her for the attention of the jockeys.

A noose of the same kind of cord they used for control lines on the gliders suddenly drew tight around my left ankle. Instinctively I rolled away and drew the cord up tight in a reflective motion of escape. They came at me like little tigers and threw me flat again. I relaxed at once, unsure how much they might injure me were I to struggle.

As they slowly unpiled, Carina slipped below the horizon and the red twilight of a dense sea of atmosphere colored the whole flat landscape. The terminator, I knew from my search missions, was unusually broad because of the density of the atmosphere. Still, Six's high rotational speed meant that within minutes we would be in pitch darkness, occasionally relieved by the hurtling transit of the two tiny moons. Stars there would be virtually none—the sea of air above us would screen out all but the brightest, and the slowly descending flying forest, which I gathered occurred only intermittently over the surface, would occult many that might otherwise be seen.

I've heard it said that all diurnal creatures respond to the withdrawal of light. I'll tell you that my kind of human, at any rate, gets even hungrier. It was dinner time, by my stomach. I hoped my little buddies ate my kind of grub.

V

A new kind of activity began as the light went from pink to red to magenta. One of the jockeys, a male, doffed his stiff yellow cape and withdrew from the cockpit of what I suppose was his own glider a kind of apron, which he fastened around his waist. Moving off twenty or so meters from the rest of us, he knelt down and made obeisance to the glow of the departed sun.

Taking a small article or two from the pouch of his apron, he was still for a moment or so, then suddenly moved in sharp jerks while still kneeling. The magenta light faded into darkness. Then there was a glimmer of flame from the aproned jockey, and a shriek from all the others. As the firemaker stood up, lit by the small blaze of dried ferns in front of him, the others went slowly forward, kneeling briefly a time or two as they approached the fire.

Two of my captors kept hold of my ankle leash as I walked cautiously toward the flames. Various jockeys were scrounging around for fuel, which they fed with care, keeping the fire quite small. When I reached the fire-maker, I held out my hand for his fire-lighter.

He shook his head, and there was a mutter from the jockeys. Apparently I had hit another taboo. My thoughts weren't as quick as they might have been. Looking at what he held in his hand, I could see a

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length of bamboo-like stick, with another stick of suitable diameter fitting down into the hollow of the bamboo. He was holding a primitive form of piston and cylinder.

My stupidity, or smug superiority, made me grin in the firelight, tap the side of my head and nod, showing that I knew how his compression-ignition fire-lighter worked. He was fearless, or completely dedicated to the priesthood he represented. His knife was in his apron, and he came for me with it without a single second's hesitation.

In a civilized world, where your associates know you are a Nonviolent Pacifist, the problem of physical assault is almost completely absent. I could not recall having to withstand it.

The animal in us is too deep, and before I had time to rationalize and permit the attack by the priest, I had leaped aside, striking him a backhanded blow over the kidneys that knocked him flat.

He was not discouraged but with a wild cry struggled to his feet. My thinker got going about that time, and I clapped my hand ostentatiously over my mouth several times, while dodging his next attacks. Then he got it. I wasn't going to spill the beans. He drew himself up to his full tiny height and gave me a stern order, pointing to the last traces of afterglow in the West.

I knelt, facing that way, and gave Carina my obeisance, too. Whether this made me a member of the priesthood occupied my waking thoughts until the sleep of fatigue claimed me, still unfed.

Morning light found me still sacked out. Small hands shook me awake. There was food. During the night the little flappers had returned to the bracken, and the jockeys had stolen around hunting for them. They were fair grub when skinned and broiled over a fern fire.

A little inspection of their skeletons convinced me the flappers were not birds in any sense, but probably were as mammalian as my captors, having developed somewhat in the manner of flying squirrels. This, at any rate, explained the low aspect ratio of the gliders' wings. The jockeys had copied nature, a nature that did not need much efficiency in so dense an atmosphere.

As the thermals built up, I was led to the large glider and carefully put aboard. They had made a few modifications of the rattan so that I could squat down substantially over the center of pressure of the wing. A doubled launch cord was used, and we were heaved droopily into the thick air when Carina was about an hour high.

The surge of the first thermal was quite plain, and our little pilot banked us around in one of those creepy rudderless turns I had grown used to, staying within the rising cylinder of air. In no time at all we had what I took to be a thousand meters of altitude. The flying

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forest had risen far above us by that hour. In company with at least some of the smaller gliders, we proceeded northwest over a rather drab and featureless green landscape, pausing occasionally to circle in a strong thermal to regain altitude that had been lost by what I took was haste to complete our journey. Our flight took us in the same direction they had carried Diane. Ahead lay a confrontation.

By noon we were on the home stretch, and our pilot no longer sought any further lift. He kept the nose down, gliding in a straight line for a cluster of buildings on the horizon. He'd nose down until the structure would begin to flutter with drag stresses and then ease the nose up just enough to keep our speed from tearing the frail thing apart.

We passed over what I took to be a central airport of the town or city. That's when I got my next shock. The pilot rose in his stirrups, spoke to the jockey beside him and dove over the side. His sidekick took over the controls.

I gawked overside at the pilot who had done the Brodie, watching the poor guy fall as we swung into the landing pattern.

Poor guy! I had forgotten the atmosphere was nearly thick enough to swim in. The purpose of the ankle-length flying cloak, also, became apparent. With his arms extended, the pilot was using the cape to ride down the sky in big swooping curves. He was going down faster than I would have liked to, but I had a lot of confidence that he knew how to use his cloak to rear back and slow down when he got ready to land.

Once we had landed, the degree of civilization on Six became more apparent. At a good many points the combination of intelligence with a dense atmosphere produced departures from Terrestrial standards, but otherwise, they were just leaving what we would have called their Bronze Age. The wheel was there and, as I had seen, fire. There were metal instruments and doodads, supplemented to some degree with neolithic holdovers such as obsidian knives similar to the one the firemaker had tried to use on me.

Iron and steel were not in immediate evidence, but that iron at least existed I did not doubt, for some of the buildings in the city where we landed were of stone, and granite is hard enough to need something tougher than bronze for a chisel.

The bulk of the buildings, however, were of vegetable materials, only slightly more substantial than the gliders in their construction. The stretchy tree-bladders served as roofs, as walls and, where left undyed, as windows.

The masonry construction, I decided, was limited to structures of public or religious significance. How right I was in this idea showed up

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at once. I was led by my ankle leash, with a growing mob of naked jockeys following us, to the most massive of all the structures I had seen. In the time it took to shut a wooden-barred door, I was inside a cell.

The place was about five meters square, with a ceiling low enough to force me to stoop, and lit by a single barred window about chest high. In the light that came in, quite bright in the noontime glare of Carina, I made out a pallet in one corner. As I walked to the window to examine my outer surroundings, a figure rose from the pallet.

"Well, they haven't sacrificed you yet, Mr. Reamy," said Diane Stiffler.

I won't say it was a shock to run into her. My big glider had taken the same course on which I had seen Diane air-lifted the previous day, and in a sense we both posed the same problem to the jockeys. They had no way of knowing that we were not a team, a pair, a set or whatever they considered a two-unit group working together.

"They had knives out once, Stiffler," I grinned.

"And let you go? You were, of course," she sneered slightly, "incapable of offering resistance, Mr. L. C. Reamy."

My smile dwindled. "My ethics deserted me, I'm afraid, Diane," I said. "I tossed one of those jockeys on his back and got across to him that I was no danger to them."

She frowned, turning to kneel on the pallet, and eventually standing. Diane was enough shorter than I was that she did not have to stoop under the ceiling of our cell. "Danger to them?" she demanded, repeating my phrase. Then she went for the throat: "You mean, you were successful in communicating with them? How did they know you weren't a danger? What kind of danger?"

I laughed, backing away from her aggressive advance across the stone floor. A little common sense started percolating through my thick head. Our interests were adverse. She had landed on Six to grease the way for the Sovbloc, in violation of the Interplanetary Treaty. The mission I was part of on Six Beta had been recruited to prevent either Bloc from getting a preferred position.

"You want to know too much," I said, continuing to chuckle. "It's time I clammed up."

She shrugged, ramming her fists onto her hips, her feet apart. "You won't talk, eh? So I'll ask *them*." She sounded pretty smug.

I let defeat sound in my voice: "You mean you can talk with them already?" I wanted to know.

"Hah!" She leaned back to throw her words at me. "As if I should answer *your* questions! Well, there is no reason why not: Perhaps I can't exactly talk with the natives yet. But I have identified ten or twelve operators in their speech."

"Operators?" (Hollowly.)

"Oh, you know," she said with that viciousness which is peculiarly

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feminine. "The really important words. 'Through.' 'By.' 'Between.' 'Under.' 'Because.' That kind."

"Oh." (Grudging respect!)

She laughed softly, letting her hands fall to her sides and moving slowly toward me. "You would have been trying to identify nouns, I suppose, Mr. Reamy?" she asked lazily.

"Maybe," I agreed doubtfully. "I couldn't operate the way you are going about it, that's a cinch."

"The advantage of being a trained linguist," Diane told me. "And just to cheer you a little, L. C. Reamy, you might as well know that Sixian is a positional speech, like Chinese. But unlike Chinese, it is inflected about as much as Sanskrit."

"Sanskrit?" (A note of terror peeped from behind my query.)

"A forebear language of what you and I speak," she said, offhandedly, turning away to look out the barred window. She had to bend down to some extent to make it possible. "For your information," she said, coming back to me with a stride that smacked of relish. "Sanskrit had twenty-six declensions, and innumerable moods and voices. Well, Sixian makes Sanskrit look as simple as Malay, and that is as simple as you can get."

"Sure," I said, desperation beginning to show. "Everybody knows *that*."

Diane started suddenly, turning toward the barred door to our cell. Several of the jockeys were there, and a turnkey was opening up. The deputation came in.

"Listen to this," she said quietly, pushing by me to go up to our callers. Her voice was quick and urgent as she brought forth the weird sounds I had first heard her use when we were captured out on the bracken.

The most richly dressed of the jockeys raised a hand, expressed what was clearly surprise to some of the others, and moved quickly to stand before her. Two or three others tagged along at his heels.

A jerky, nervous colloquy of some kind started between them. The chief jockey gave out with plenty of nods, a smile, then a wide grin, and otherwise showed pleasure at Stiffler's accomplishment. While the two of them chattered and whined at each other, a couple of his sidekicks came over to me and tried the same song, second verse.

I shook my head. *"No capish,"* I said, trying a grin. I offered to shake hands. They never had heard of the gesture, and started back a pace or so. Their words became more urgent, obviously irritated. Then one of them threw up his hands, and they went back to the successful conversation going on between the big cheese and my opponent.

She was scoring heavily. The head gazabo gestured with his palm, offering Diane the chance to leave our cell. She looked back at me over her shoulder.

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"So long, stupid," she called out.

Ducking so that I wouldn't hit my head, I moved over quickly to the door, and would have gone through it right behind her except for the press of little bodies to keep me from it.

"Stiffler!" I said. "For Pete's sake, me, too!"

The big cheese laid his palm against my chest, and plainly asked a question of Diane, who was already out in the dusty street.

"Nyet!" she snapped, and repeated the negative in Sixian, while drawing her finger across her throat.

VI

Back behind the barred door once again, I tried to take stock of my situation. There weren't enough facts to go on.

Carina had passed the zenith some time before, during the business of getting me from the central airport and into the cell I had shared so briefly with Diane Stiffler. The shaft of light coming through the waist-high window crept across the floor, and the color of the light yellowed and hinted that it would soon redden. When the first ruddiness showed against the wall across from the window, I had visitors. It was a small party, dressed rather plainly in a type of apron.

One of them, from his motions, I figured out was the community firemaker. After my cell door had been opened and they all came in, he knelt and rammed his little piston home a few times in its cylinder, facing me, and got a bit of fluff glowing. A couple of females came forward, feeding the tiny glow with shreds of fern, and helping him blow the fire into life. In a few minutes they were feeding finger-sized sticks to the blaze. The smoke, of which there was plenty, eddied upward and out through a barred hole in the stone ceiling that I had not noticed earlier.

A couple more of the females came in, carrying a bowl of pottery in which were the skinned and gutted carcasses of a dozen or so of the flying mammals. While one of the males came over and pinched and prodded at me, examining just how fat I was, the cooks began roasting one of the little mammals.

They considered it cooked more quickly than I would have, but I gave them no argument, and tore the rare and juicy meat from the tiny bones with my teeth. The smoky fire had given the meal plenty of taste, and I must report that I ate with relish.

As soon as I had begun to eat the first piece of meat, the cooks started roasting the second, adding more sticks to the little fire. Five or six of the animals filled me up pretty well, but they tried to press more on me. I was being fattened for the kill.

Well, it was not an altogether unpleasant idea. Any appreciable fattening, if it were not purely ritual-

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istic, would take a number of days. And the idea of the passage of time got my thinker working a little better. I took one more piece of meat, more, really than I wanted, and munched slowly at it. At the same time, I started fishing sticks from the fire, choosing those that had burned through the middle so that I had a fairly solid piece of wood, tipped by a charred end.

There was, for a while, objection to this. But as I took care to extinguish the glow at the end of each faggot, the resistance ended. I accumulated a couple dozen writing tools in this fashion before they got tired of my dawdling over the food, packed up their remaining groceries and started to put out the fire.

I let out a holler at this, and ran over to the nearest wall, making shadow-figures with my fingers. It was the only way I could figure to ask for a light. After some moments of dumb show on my part, one of the jockeys tapped his head and left, only to return in a couple of minutes with a small lamp, consisting of a floating wick in a bowl of oil. It was strapped to a little cradle so that it could be hung to the bars of the "chimney" without the lamp's blaze kindling the fibers that supported it. I grinned and nodded enough times to make it plain I was expressing my thanks. A few shrugs said that the gift was not important. The wooden bars closed once again, and I was alone.

In my one-candlepower light, I started to work. My first question was whether to use the floor or the walls. The masonry skills of the jockeys weren't any great shakes, and none of the surfaces in the room was unusually smooth. Deciding that I had enough ideas to cover more area than the floor provided, I went to one of the side walls and began my sketching.

My resulting three-view drawing of a glider left something to be desired, but it was, from an engineering standpoint, an accurate representation of the machines the jockeys were flying.

On the opposite wall I drew with much more care. Here I laid out a better mousetrap. The improvement on their glider featured some very simple ideas. In the first place, I put some dihedral in the wings. Secondly, I increased the aspect ratio, so that span was about five times root chord, while sticking to their essentially correct idea of an elliptical plan-form. My biggest change, although only the engineering-minded would catch it, was in the empennage. I drew control horns on the rudder similar to those the natives had used to flex the stabilizer.

In the remaining wall space I made enlarged layouts of a couple of other thoughts. One was a more efficient wing section, employing a double-surface rather than their single-surface construction. That, I figured, was enough for one night.

It was a darned good thing I had

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spent the night drawing on the walls with my sticks of charcoal. Little hands shook me awake long before I would have awakened. They were ready to lead me out—and by "they" I mean some fancily-dressed characters who had the mark of priests about them.

Since my cell window faced west, there was not much brightness in the room. The moment I got the picture of what my captors were up to through my fuzzy head, I grabbed one of my drawing sticks, and pushed through the crowd to the wall, and pretended to make improvements on one of my drawings.

A couple of priests were tugging at me, and in the background I could see a third getting a noose ready to slip over my ankle, since my head was a little out of reach. But still another of the priests called for a pause. That was the first sign that I was getting to them. Knowing perfectly well that my speech meant nothing to them, I nevertheless started an explanation.

"Listen, kids. You are killing the goose that can lay the golden egg. Don't do it, little buddies. See that wing? That's got efficiency written all over it. It'll slip through the soupy air on this planet like goose grease compared to those deep-camber jobs you're flying. Like this:"

I started making hand-motions, showing the slow and the fast, and stretched out my arms, with my hands flattened to represent wings. I did some nice gliding turns around the room while they watched, half surprised, half interested.

The priest who had called for a pause went over to my better mousetrap and pointed out some of its features to the others. He tried asking me questions, and I pretended I understood him. He had enough rank, I figured out, to put the kibosh on the idea of slipping a knife into me immediately. His authoritarian voice plainly gave some orders, and a runner departed at a trot.

We continued our joint examination of the good ship Mousetrap, with his gibberish questions eliciting my gibberish answers. But that did not last long.

The jockey who came back with the runner was wearing what I would have called a carpenter's apron. Several tools hung from it in loops, among which I recognized a knife, an awl and a spokeshave. I had found a technician.

This time I was not having my hand refused. When the aproned gent came to look over the Mousetrap, I moved cautiously to his side, reached slowly for his right wrist with my left hand. With a frown, he let me take it. Slowly again, I extended my right hand, taking his palm, and went through a gentle and formalized handshake. There was some laughter at this, but the idea of joint action was not that difficult to get across.

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Once again I started my explanation in English of the merits of the Mousetrap to the apron-wearer. My drawings were not clear to him, and he kept shaking his head. He pointed to the plan-view of my improvement on their glider and shook his head, gesturing to show that the high aspect ratio was no good.

But in turn I shook my head vigorously, and tapped at the side of my think-tank to indicate I knew what I was talking about. With the greatest care of all, I gingerly sought permission to remove one of his tools from the loop on his apron. He didn't think much of the idea. Whether it was because of a strong sense of personal property, or because he thought I might turn the awl on him as a weapon, he resisted at first. But I kept up a quiet insistence and finally got my way.

With the tool in my hand, I took my pigeon gently by the arm and urged him to leave the cell, pointing off into the distance. I made every kind of a practical motion with the awl, showing that I knew how to use it. When that got me nothing, I returned it to him with the same careful slowness, fearful that he would interpret my movement as an attempt to harm him with its point. Still, when it was once again safely hanging in its loop, he gave me no trouble when I sought to take the spokeshave from him. This was a more illustrative tool and I got to him promptly when I showed that I knew how to use it.

Handing him one of my drawing sticks, I got it worked around to where he held it while I carefully drew shavings from it with what was, after all, a pretty sharp blade. Like the awl-point, it had the shiny glint of iron rather than the darkness of bronze.

Once again, I took him by the arm, indicating I wanted to go with him.

The chatter I had heard up to that point was nothing compared to the argument which that started. The woodworker now had a powerful yen to get me to his shop. And the priests had just as much intention to get me to the altar. It was the same bossy priest who had sent the runner away who finally gave the nod to my idea. But he took precautions. As we walked together down the path between the buildings, the technician on my right, the priest was close at my left, and a gang of his followers came along to make sure I didn't get away.

VII

Society on Six had proceeded to the point of division of labor I discovered, when they finally got me to the shop where they built their gliders. The place was of vegetable construction, but the built-up ceiling joists spanned a good ten meters. Several gliders, of various sizes, were under construction. I saw no evidence that they had the idea of mass production or standardized

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design. Apparently each glider was one of a kind.

What I wanted was a completed glider. I had to walk around the shop for a while, shaking my head as I came to one or another in the process of construction. At the far end I found it, a two-place machine virtually completed. Most important, the controls were installed. They let me move the two levers, and I found that my first ideas were right. The left-hand lever warped the stabilizer to change the amount of decalage. The right lever warped the stubby wings to impart aileron action. As in the first glider I had examined, there was a vertical fin, but there was no provision to flex it for rudder action.

Turning to the head mechanic, who had come to my cell, I pointed to the strings they used for control cables and tried to show that I wanted some.

It took some time, but after a while another mechanic came forward with a good-sized roll of the cord wrapped figure-eight style around a stick, the way every kid is taught to wrap a kite cord.

I got a shock when I tried to break some of the cord. It had the natural springy tenacity of nylon and cut my knuckles sharply. Holding out a hand, I was given the head mechanic's knife. It had a good edge, and I cut the lengths of cord I needed.

Because I knew exactly what was involved, stringing the additional control line was not as hard as otherwise would have been the case. Since I was not above swiping a good idea, I took a careful gander at the way they had mounted the elevator control horn, found a piece of wood of the right size, and lashed a rudder control horn in a good approximation of the same fashion.

Plenty of jockey comment took place with each change and addition I made to the ship. Getting the knife again (he wanted it back whenever I laid it down) I used it in a little careful surgery to cut a portion of the vertical fin free of the fuselage so that it could be sprung back and forth like a rudder. As in the case of the stabilizer, the natural elasticity of the reeds used for the rudder frame was quite enough to eliminate the need for any hinges.

At last, with the rudder lines tied to the aileron control lever, I moved the handle. As the right wing was warped to a higher angle of attack, the trailing edge of the rudder was swung to the left. I worked the control a number of times, trying to judge by eye whether I had proportioned the amount of rudder control correctly to the amount of wing warp. By sliding my newly-installed control lines up and down the lever somewhat, I could alter the linkage. At last it had a "right" look, although only test would tell.

By this time the whole work force of the shop, perhaps ten or fifteen in number, had gathered around. Theoreticians among them

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were sounding off at a great rate on the significance of my coupled aileron and rudder. I was pretty sure none of them got it.

In the long run all of us fly-guys get down to the point where we have to explain it with our hands. Since I had none of Diane Stiffler's skills with their lingo, there was no other way.

So I knelt down beside the glider I had altered and made wings of my two palms. Showing by extending my arms palm down from my sides that I was flying, I "warped" my wings by twisting my right arm so that the little-finger side of my hand, the "trailing edge" of my wing, was lowered, and by twisting my left arm the other way, so that the thumb, or "leading edge" of my left palm was lowered. Then I "banked," leaning my body slowly to the left, and then twisted my torso to indicate that I was making a turn to the left. Neutralizing my controls, I "leveled out," and then reversed the aileron action to show how to make a turn to the right.

There was a nod or two, a quick word of explanation shot over a couple little shoulders, and the whole gang got the picture.

Clapping my hands to emphasize my point, and shaking my head in the jointly accepted symbol for the negative, I repeated the whole series of movements, but this time with a difference. As I "warped" my right wing into the added-lift position for a turn to the left, first I "banked" left and then, twisting my body *to the right* rather than around to the left in a turn, I showed that the wing with the higher angle of attack also generated more drag than the other wing, and that it twisted the glider *against* the direction of turn that the bank would otherwise have induced.

"That's called inverse yaw, kids." I told them. "And Wilbur is the guy that figured out you have to offset it with a rudder."

The idea took a while to jell. I came pretty close to popping the gussets on my sacroiliac before I did enough "inverse yaw" to get the idea across. It was the head mechanic who got the idea first. He repeated my gesture of tapping his head, and launched into rapid-fire speech, making "flying" motions with his hands to get the argument across to the others. Oh, it didn't sell easily, and finally he got to the point of shaking a fist angrily, storming around the shop while picking up materials and more tools. With a plain "come on with me" gesture, he led the whole bunch of us out into the outdoors. We were on the way to the airport.

He was a good deal more careful than I had been about attaching the rudder horn to the craft he chose for alteration. Some additional hard blocks were installed to serve as pulleys, at points where I had rather fudged on the design. But before noon the builders, with several of

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them now participating, had considerably improved on my version of rudder control.

They were getting a launch cord laid out on the short greenery of the airport, a little ahead of time, for my dough. Somewhat to my surprise, their test pilot turned out to be a female. She tried to get aboard, but before I would let her take off, I showed her how the lashing of the rudder lines could be moved up and down the aileron lever, increasing or decreasing the amount of rudder action with a given amount of aileron movement. After all, too much rudder would mean that a skidding turn would have replaced their usual slipping turn, and one was about as poor as the other.

She gave a monstrous jerk of her head, and called over the chief mechanic, who I decided was also the boss designer. The test pilot operated the lever several times, craning around to get a view of the amount of rudder action, while talking in quiet, serious tones with the designer, who was standing at her side. Between them they chose a setting with more rudder action than I had thought was called for. I did not resist this change. Their race had spent a long part of its history in the air, and I had an idea it could intuitively figure the action of its own soupy atmosphere on surfaces better than I could.

Just how the word got around, I don't know. But by the time they were stretching out the launch cord for the test flight of the ruddered glider, there was a mob of several hundred standing around, yipping and hollering back and forth. I looked for Diane Stiffler, but her height was nowhere visible.

And then the altered glider was swimming sluggishly into the afternoon breeze as the shock cord slowly heaved itself back to its natural length. I held my breath. If something went wrong now, my name would be mud for however few minutes it would take my captors to finish me off with their knives.

By the time the launch cord was slack, our lady jockey was several meters high and heading into the declining sun.

The glider tossed from side to side, and for a moment I thought something had let go. But I was seeing no more than the heavy thermal activity in so dense an atmosphere after a few standard hours of sunlight.

The other end of the stick, of course, was the fact that my lady test pilot had no distance at all to go to find a thermal. In a couple minutes the stubby-winged soarplane was climbing like a homesick angel, turning in tight circles to stay within the updraft.

Then she had broken out of the thermal and came swooping down over us, nose pretty far down, and moving along, I judged, at fifteen or twenty meters a second. She took to the coupled control like a duck does

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to water. There was a lot to the comparison—she and her kind had been raised flying, and it came almost as naturally to them as it does to the birds. But her first really sharp turn and bank was hair-raising, as she warped the deeply cambered wings to their full extent and wrapped her eggshell craft around in a pylon turn, almost fully vertical, right over the heads of the crowd. A shrill cheer leaped from the throats around me. It took only an instant for those natural aviators to appreciate what they had just seen.

VIII

In the standard month that remained before the first legal landing would be made on Six by terrestrials, my situation changed considerably. Oh, I was still under restraint, and they locked me up every night. But I could sense there was a difference.

We spent the month, pretty largely, in designing and building the good ship Better Mousetrap. The size of wing I had drawn called for a built-up spar, something they had never fooled around with, even though the built-up ceiling joists of the glider factory said the construction idea was not foreign to them. Since there were good natural glues, and all kinds of shrinkable wrappings, after a reasonable amount of experimentation, we came up with a main spar that was the pride and joy of Tschildet's eye. In the whole time I was on Six, his was the only name I ever learned, or tried to approximate.

During the month, of course, I spent a good deal of time trying to get a lead on Diane Stiffler. For whatever reason, my little buddies had no intention of letting the two humans on their planet get back together. At first I suspected that they had done my wordy opponent in, but one time or another I saw her at a distance, usually walking along with an entourage of priests. On that basis, I decided, we were attached to opposite factions of society, she to the religious, I to the practical.

One of the design criteria of the Better Mousetrap was a cockpit designed to fit me, so that I could operate her controls. When the day came for a test-flight, there seemed to be no question in the jockeys' minds but that I would accompany the test-crew.

They probably had a variety of reasons for sending several of their race along on the first flight. Most important, I decided when I was shown a couple of knives, was their fear that I might decide to fly away in the superglider. I tried to disabuse them of the idea, shaking my head powerfully, making flying circles and showing by grounding my hand in the "grass" that I meant to return to their city airport.

The chief test pilot was again my little female friend. She sat beside me in the nose. Tschildet and

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one of his chief tinkerers sat behind us, filling up the cockpit. They used four of the usual launching cord strands, and a good fifty of the jockeys stretched it out to give us a boost into the air. The launch seemed far too slow. I had visions of the Mousetrap sliding along on its skid, failing to get airborne, and coming to an ignominious halt on the "grass." But then the little gal at the controls eased the stick back. Mousetrap's nose came up and we wafted into the air. The long span gave us an unwonted stability. When the first thermal hit us, there was very little wing-waggle, and she had us climbing smoothly in no time.

Because the wing was double surfaced, and because I had insisted on considerably more streamlining then they were used to, Mousetrap flew with an unaccustomed silence. More than silent, she was *fast!* The double-surfaced wing had twice as good a lift over drag coefficient as their deeply cambered single-surface airfoil.

She let me take it away from her when we had a couple hundred meters over the field. Because I didn't want any knives sticking me in the back, I held the Mousetrap in tight turns over the airport, climbing her from one thermal to the next. At a thousand meters, by my judgment, I dropped the nose, kicked her into a straight slant, aimed at the center of town, and let the speed build up.

The design job, native and imported, had been a good one. No shimmy, no shake, just smooth, speedy penetration of the soup. Leveling out, still moving three times as fast as they had ever been able to fly, I banked the Trap into a tight turn and used elevator to help us around in a vertical bank. There was a noticeable increase in G-load, and I could see our relatively long wing flex under the strain. But everything held, and I eased her back level, headed for the airport, to the tune of excited comment from my passengers.

One thing I had not been able to sell them on was the idea of flaps or spoilers, so I had quite a time getting the efficient, clean kite back down to where I could land it. But when I hauled back and slowed the Trap down, there was none of that jittery waggle I had associated with the tipstalls caused by low aspect ratio. They got the point and were crowing with triumph when I greased her down onto her skid in as sweet a landing as you could want.

Fate lent a hand just then. Over the hollering of the big crowd, our largest to date, we could all hear a completely alien sound. Just the loudest Klaxon you could possibly imagine. And that's exactly what it was. The Federation was making its "first landing" in the specially equipped vehicle designed for grounding without a grid. In our terrifically dense atmosphere, the

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racket of its horn was audible for a huge distance.

"Let's go!" I cried to them. I pointed in the direction of the racket and made flying motions. The hooting continued in the distance where, beyond eyesight, the Federation's ship was slowly settling to the surface. And then the hooting became intermittent, a bellow, then a few seconds of silence, as my friends from Six Beta mooed and called for the natives to come and see what the heck was making all the racket.

After a while I got them fired up to the idea that we should take the Trap to the source of the sounds. But the idea didn't sell until they had brought Diane Stiffler to the airport and loaded her into one of their own gliders. Diane and her party took off first, but our faster ship quickly caught up with the fleet that was making for the spaceship's racketing Klaxon, and we passed them.

In less than half an hour, steering by sound, we passed over the grounded spaceship. Its length of a couple hundred meters towered up above the bracken. I could see as we circled lower that it had passed slowly through some of the flying forest, for remains of bladders and plenty of green strands were pretty well draped around the hull. About twenty terrestrials were standing around on the bracken, a good many of them pointing up to where our slick glider was circling. Somebody ran to the companionway, and the Klaxon stopped its infernal shooting.

I let my little girl friend shoot the landing, which she did with as much class as you could desire, sliding up to within twenty meters or so of the base of the spaceship.

The chief was at the head of the group that came running over to us. He recognized me the moment I stood up in the cockpit, towering over the others in the crew.

"L.C.!" he cried. "Are you all right?"

And then there was a whole gang around me as I stepped out, slapping me on the back, glad to see me alive.

"How do you like our ship, Chief?" I asked him.

"You certainly taught them a lot in a hurry, L.C.," the chief said.

I laughed at that one. "Just a better mousetrap, Chief," I explained. "They all fly things around here. Some of the local product should be arriving in a few minutes."

"Were you forced down?" he asked.

"You had it right, Chief," I said. "The Sovbloc had landed a couple linguists on Beta, and they had stowed away. I guess they had it figured that John Yousoufian would have the mission and that he would drop them by parachute without letting on what he had done."

He scowled at that one. "And Eddie?" he asked.

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"They got Eddie, Chief. I'm sorry. He's dead. While his killer is dead, the other contraband got down with me. She ought to be along any minute. She had no part in Eddie's death, I have to say that."

"The linguist, eh?" he pursued me. "That Stiffler woman? Was she able to talk their lingo?"

"Right away," I said, surprised at the accuracy of the Federation's intelligence.

"And you? You can talk with them, too, L.C.?"

"Oh," I told him. "Just hand-gestures and drawings. We get along. Here, this guy coming over, the one with the apron, he's their head glider designer. His name is Tschildet. He likes to be called that. Shake hands with him."

The chief seemed to know how to handle himself on a strange planet, and Tschildet gave him full courtesy.

"I must say," the chief said out of the corner of his mouth. "You seem to be on good terms with these people."

"In like Flynn."

"And Stiffler?"

I shrugged. "Haven't seen much of her. Ask her yourself. Here she comes."

Diane was walking slowly across the bracken from her grounded glider to where the party of terrestrials stood. The natives in her fleet mostly ran over to look at the spaceship. A few were still tagging at her heels asking, I felt sure, for an explanation of the giant structure. She was shaking her head, refusing to speak.

"Well," the chief was saying, "knowing that you are a Nonviolent Pacifist, I can see why she's still alive. And I suppose, if you can assure us that the Sovbloc has established no primacy because of her, she'll get away with this."

"Ask her," I suggested. "Find out how she stands."

And then Diane was before us.

"You realize you are under arrest, contraband!" the chief said, trying to sound severe.

"Not much change," she said nastily. "And the quicker you get me off this depressing planet, the better!"

The chief shook his head. "I can't understand it," he said to her. "Here you are, a prize linguist, able to talk a blue streak with the locals. And here's Reamy, making dumb-show with his hands. How does it occur that he has them in the palm of his hand, and you are still a captive?"

She shook her head. "I should have killed him when I had the chance!" she said.

"And you can't tell me how he did it?"

"No, I can't," she said angrily.

The chief turned back to me.

"She overlooked one thing," I grinned at him. "You have to have something to say!" ■

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P. Schuyler Miller

SECOND-STAGE SFMEN

Sam Moskowitz is one of the very few people who have probably read every word of every science-fiction and fantasy story published in the forty years since Volume 1, Number 1 of *Amazing Stories* appeared on the newsstands. He may be the only one who has carried his familiarity back to the magazines and books published before he was born, almost as comprehensively as he has viewed the present scene. In "Explorers of the Infinite" he gave us a running chronicle of the authors and stories that stood out in the formative years of science fiction. Now, in "Seekers of Tomorrow" (World Publishing Co., Cleveland. 1966. 441 pp. $6.00), he introduces us to twenty-one "masters of modern science fiction," with side glances at several more. A companion anthology, "Modern Masterpieces of Science Fiction" (which I will describe separately for lack of space here), offers stories by these twenty-one shapers of present-day science fiction, among them John Campbell.

It may be a purely subjective reaction, but "Seekers of Tomorrow" seems to me to be a much better book than "Explorers of the Infinite." It covers all-new ground, for with the exception of Ray Bradbury and maybe Arthur C. Clarke, literary historians have taken very little notice of the science-fiction field. The author knows most or all of these writers personally, or through correspondence, and has a direct knowledge of what makes them tick, what they have written and why, and what effect they had on the science fiction of their time and of the present.

He has also, I am happy to say, made a third book a necessity. Although these writers—and John Campbell as the editor who found and developed most of them—are largely responsible for the kind of science fiction we now have, and several of them are still writing it, there are other, newer, important writers who are taking today's SF in new directions and who may be the shapers of its future. You won't find Cordwainer Smith here, or the new English school exemplified by Brian Aldiss and J. G. Ballard, or

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most of the other names you now see regularly on the magazine covers.

"Doc" Edward E. Smith opens the book and links it with the era that preceded 1926, though neither he nor Murray Leinster, who also spanned both eras, has ever been "dated." The other featured writers are John W. Campbell, Edmond Hamilton, Jack Williamson, "John Wyndham" (John Beynon Harris), Eric Frank Russell, L. Sprague de Camp, Lester del Rey, Robert A. Heinlein, A. E. Van Vogt, Theodore Sturgeon, Isaac Asimov, Clifford D. Simak, Fritz Leiber, C. L. Moore, Henry Kuttner, Robert Bloch, Ray Bradbury, Arthur C. Clarke, and Philip José Farmer. Mortimer Weisinger is included for the part he has played in making a place for science fiction in the comics.

This is still not the study of evolving science fiction that should be written by someone who has had a part in it. That almost has to be someone with an academic outlook —Jack Williamson, perhaps, or Theodore Cogswell. It is a chronicle, like Richard Lupoff's recent biography of Edgar Rice Burroughs. Unfortunately, there is probably no bystanding *literateur* with Sam Moskowitz's knowledge.

I find myself, with this book, beginning to back off on a complaint I have made about Sam's other books and articles: what seemed to me his excessive contention that Story A was based on Story B. Now, reading his abundant synopses of stories published at a time when I was still writing science fiction, I find abundant sources in stories I must have read and forgotten for stories I outlined and never wrote—and one or two I did. True, I also note that others used certain themes and gimmicks long after I had intended to do so, which probably means that these things are "in the air," in science news, in discussions at conventions, in correspondence, in the books people are all reading.

Sam also reveals that he has been doing himself an injustice by letting his meaning be misunderstood when he insists on a "sense of wonder" as an essential element of good science fiction. He lets Rollo May, author of "Man's Search for Himself," clarify what he has been driving at all these years:

"Wonder is the opposite of cynicism and boredom; it indicates that a person has a heightened aliveness, is interested, expectant, responsive. It is essentially an 'opening' attitude . . . and awareness that there is more to life than one has yet fathomed, an experience of new vistas of life to be explored as well as new profundities to be plumbed."

What better description could you ask of the essence of science fiction? "Seekers of Tomorrow" makes pretty clear that a sense of wonder was the chief factor linking these twenty-one very different people.

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THE NEW INTELLIGENT MAN'S GUIDE TO SCIENCE

By Isaac Asimov • Basic Books, Inc., New York • 1965 • 864 pp. • $12.50

This new edition of Isaac Asimov's *magnum opus* simply cannot be passed off with a note in the reprint section. In the first place, it isn't a reprint: he has written the old two-volume set over again from stem to stern, keeping the same organization but brings it very much up to 1965. His publisher may have allowed him a say in what illustrations would be used and how they would be captioned, as it evidently didn't the first time 'round. At any rate, these are relevant, often new, and don't contradict the text.

In a nutshell, Dr. Asimov has really managed to tell his readers "all about science" within the covers of one book. The new one-volume edition, the Good Doctor reports, contains twenty per cent more—70,000 words more—than the 1960 two-volume edition. It reads every bit as well. And, which I am sure tickles Old Teacher Asimov, when it hasn't told you "all" it will usually have given you the itch to go looking for more, and told you where to go.

THE PSEUDO-PEOPLE

Edited by William F. Nolan • Sherbourne Press, Los Angeles • 1965 • 238 pp. • $4.50

William F. Nolan is or was an editor of *Gamma*, a west-coast science-fiction magazine that I have never yet seen on a newsstand in the East—though I'm assured it can be found in New York, Philadelphia and other cities. In this collection he makes up for the recent lack of "theme" anthologies, with which Martin Greenberg and Gnome Press experimented so successfully years ago.

The "pseudo-people" of the book's title are androids, the "meat robots" for whom the term "robot" was coined—in Capek's "R.U.R."—but which became established in science fiction in Edmond Hamilton's "Captain Future" yarns. The fourteen good stories have been sought out and are *not* the ones you always see: there's a "lost" story by Henry Kuttner, an event in its own right, and the only really familiar stories are Richard Matheson's "Steel"—a human manager goes into the ring for his broken-down android boxer—and Charles Beaumont's moving "Last Rites." (Can a dying android receive the last rites of the Church?)

Five of the stories are brand-new, written for the book, and Dennis Etchison's "The Fires of Night," which explores the emotional barriers between one hundred per cent human beings and partially mechanized or repaired people, is one of the best in the book. In Shelly Lowenkopf's "The Addict" an android becomes a compulsive book-eater.

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In Ron Goulart's "Badinage," a mere citizen tries to resist the credit androids. In Frank Anmar's "The Fasterfaster Affair" we have a wild parody of the James Bond stories. All three are good comedy. Charles E. Fritch's "Geever's Flight" is more ordinary: the one about the midget androids struggling for independence from the Shadow God who made 'em.

Kuttner's "Those Among Us" is a fine opener for the collection: A lone man struggles with the conviction that androids are rapidly replacing people. Ray Bradbury's "The Changeling" is a gimmick story about the man who leaves an android with his wife while he goes out catting; rather, it's about the android. Chad Oliver's "The Life Game" is a very different companion piece to the Kuttner story, but Isaac Asimov's "Evidence" is a relatively minor episode in his positronic robot series—the theme of "The Fires of Night" with a totally different approach.

James Causey, in "The Show Must Go On," has a bathetic bit on the theme of android slavery in show business . . . a companion to Matheson's "Steel." Robert F. Young, in "Juke Doll," has one of his best stories—sentimental as always, but moving. And Nolan closes the book himself with "The Joy of Living," on the question: how human is a synthetic human?

It's one of the best anthologies we've had in a long time.

VOICES FROM THE SKY

By Arthur C. Clarke • Harper & Row, New York • 1965 • 243 pp. • $3.95

These short articles, gathered from sources as disparate as *Rogue, Playbill,* the 3M Company *Tartan,* the New York *Times,* and *Astronautics & Aeronautics,* make clear why Arthur Clarke is one of the winners of UNESCO's Kalinga Prize for outstanding popular science writing. Nobody combines imagination and lucid exposition of complex ideas quite so well.

The two dozen articles in the book fall into three groups. The first takes us into space—what is there and why we belong there, too. Neil Ruzic, publisher of *Industrial Research,* wanted Clarke to write the series of articles that developed into the book, "The Case for Going to the Moon." Clarke was too busy, so Ruzic did the book himself—and well.

Section Two deals with communications satellites. I am sure that you must know that Clarke was first to propose a ring of satellites in stationary orbits above the equator, serving as communications relays. His 1945 article in *Wireless World* is reprinted in an appendix. The prospect of global phone calls coming at all hours suggests to the author that we may have to learn to do without sleep.

The final section is a *bouillabaisse* of tasty morsels, ranging from Clarke's Kalinga Award

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speech to comments on fan mail to an excellent introduction he did for the Washington Square teaching edition of Wells' "War of the Worlds." There are also some comments on the lunatic fringe of SFdom.

Read and enjoy.

CODE THREE

By Rick Raphael • Simon and Schuster, New York • 1965 • 252 pp. • $3.95

I am clearly going to have to retract complaints I have made about the quality of Simon and Schuster's science-fiction selections. This book is as modern as yesterday's Analog, where its three parts were first published as novelettes.

The author has extrapolated—or is it escalated?—today's traffic problems into a future where the North American continent is crisscrossed with a network of international thruways five miles wide. There are four graded-speed lanes each way, separated by a wide medial and divided in turn by the "Red" lane for the police—the North American Continental Thruway Patrol. The three episodes in the book follow the crew of Car 56 through routine patrols, and in the process develop the technology of the thruways in fascinating detail, and draw bitter parallels between the problems of today's and tomorrow's cops. The second episode, with the son of a tycoon trying to use his father's influence to escape a traffic charge, was my choice for a Hugo in its year.

In outline, the plots sound like today's newspaper. But these are real problems and possible solutions, made convincing.

YEAR OF THE UNICORN

By Andre Norton • Ace Books, New York • No. F-357 • 224 pp. • 40¢

Andrew Norton's "Witch World" series, of which this is the fourth book, started out as a reasonably straightforward parallel-world story, in which a migrant from our Earth took a hand in protecting a feudal society both from the scientific attack by other-world creatures and from the psi powers of its own "witches." In the third book, and in a second generation, his three children venture across the ranges to another part of the main continent, long cut off from theirs by illusion and "magic."

"Year of the Unicorn" is coming at this new world of illusion obliquely. Its heroine is a young witch, kidnapped and cast away as a child on what is evidently still another part —a very remote part—of this same continent. Becoming, for her own reasons, one of the thirteen brides offered to the Were-Riders she goes with them into what may be the same place that was discovered in "Three Against the Witch World." Taken without reference to the other books, this one is pure fantasy—sword-and-sorcery, in fact.

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Taken as part of a growing whole, we can assume that eventually all these disparate elements will be related and at least partially rationalized. Right now, the mysteries have only grown deeper and blacker.

THE DARK SIDE OF EARTH
By Alfred Bester • Signet Books, New York • No. D-2474 • 160 pp. • 50¢

Because Alfred Bester writes so little science fiction, it is easy to forget how good what he does write invariably is. Here we have five excellent examples of his thoroughly individual style, all from *Fantasy & Science Fiction*, plus a wild new "novel"—which is really only a novelette—plus a possibly new short story for which no prior source is given.

A Tennessee colleague used the word "gooder" for the New England "better." In his sense, practically any Bester story is "bester" than the company in which it is apt to find itself. He writes little and polishes hard. Old themes seem fresh; old gimmicks surprise again.

"Time is the Traitor" makes moving the truism that a man who is eleven years older is "eleven years other." "The Men Who Murdered Mohammed" has a fresh twist on the paradoxes of the time-traveler who tries to change the past. "Out of This World," which may be new, gives us a phone call between alternate worlds. "The Pi Man," which I think won a Hugo for best of its year, is that surrealistic story of the compensator whose duty it is to keep the universe in balance.

The new "novel" is "The Flowered Thundermug," a wild comedy laid in a future when the Establishment is again taking a "camp" interest in its past. It parodies several other forms of short fiction in passing. "Will You Wait?" is the kind of story *Unknown* used to publish, having to do with the red tape of making—and enjoying—a bargain with the Devil.

Finally, "They Don't Make Life Like They Used To" is that memorable yarn about the last woman in New York—an independent intellectual—and the last man—a lame brain from New Haven, on his way south, who meet in Central Park just a little bit too late.

Alfred Bester doesn't write stories like these often enough. He prefers to eat regularly and well, and is said to be responsible for the occasional appearance of real SF on TV.

THE CLONE
By Theodore L. Thomas and Kate Wilhelm • Berkley Books, New York • No. F1169 • 1965 • 143 pp. • 50¢

During the early days of *Amazing Stories*, one of the most popular plots had to do with the oversized amoeboid organism that grew and grew and ate everyone and everything in sight until the hero killed it. Hollywood used it recently with the

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"Blob" of strawberry-pink goo, and I recall a pretty good English SF thriller in which it looked more like thin tapioca.

I would never have supposed that this kind of story could be sustained to book length, but Thomas and Wilhelm have done it magnificently. Their "clone" is generated in a biological accident in the sewers of Chicago, and it simply eats, grows and evolves irresistibly while the city dissolves before it. The point of view switches suddenly and rapidly to show us new perils, but returns with fair regularity to Dr. Mark Kenniston—yep, an intern at City Hospital—who is trying to find what the TVs call an "antidote". Why the clone shouldn't be able to adapt to Mark's iodine spray, as it does to a variety of other things, deponent chooseth not to ask. It's downhill in a bobsled with no brakes, all the way.

THE BLIND SPOT

By Austin Hall and Homer Eon Flint • Ace Books, New York • No. G-547 • 318 pp. • 50¢

THE SPOT OF LIFE

By Austin Hall • Ace Books, New York • No. F-318 • 187 pp. • 40¢

"The Blind Spot" was one of the great classics of the early Munsey magazines, published in *Argosy-All Story Weekly* in 1921. Prime Press published a book edition in 1951, and had intended to publish the sequel, which Hall did for *Argosy* in 1932, after Flint's death. Prime went out of business before the project could be completed, but Ace has now done paperbacks of both books.

Although critics can point to all kinds of technical flaws in "The Blind Spot," it carries its years better than most stories from that era. I credit Homer Eon Flint with that, for his collaborator's sequel is a poor thing in comparison, and if you can't find it, don't bother to look for it. Flint was the science-fiction writer; Hall's specialty was the occult—and the "occult," in its literal meaning of "hidden," is what is to be explained when the secret of the "Blind Spot" in an old San Francisco house has been unraveled.

In present-day stereotypes, the "Blind Spot" is a "gate" between two "parallel worlds," our own and Thomahlia. Each world considers the other its afterworld, to which the souls of its dead are transported, and I have a hunch that this is the explanation that Hall may originally have had in mind, but that Flint was too rational to let it get by. Be that as it may, the superstition is mentioned in passing and never justified.

The original story is told in a series of snatches, from the points of view of a number of people. This starts by being exasperating and ends by being effective. Hall attempts it in the sequel and doesn't bring it off. The mystery begins as a

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Professor Holcomb announces that he will give an epic lecture revealing the secret of the occult—of life and death. Then a handsome man, the Rhamda Avec, comes out of the house of the Blind Spot, goes to visit Holcomb, and the professor vanishes. Others come and go, building up to a finale in the other world. In the sequel, a generation later, the Bar Senestro or king-priest of Thomahlia intends to invade our world, for reasons never really explained except that it is what villainous warrior-priests always did—and do—in stories.

I can't help wondering whether Austin Hall bothered to re-read "The Blind Spot," or had a copy he could read, before he undertook the sequel. There are discrepancies, and less is explained or rationalized instead of more. Suspense is negligible and the action is flat. If only Homer Eon Flint had lived!

THE GENOCIDES

By Thomas M. Disch • Berkley Books, New York • No. F1170 • 143 pp. • 50¢

We have destroyed the urus, the heath hen, the passenger pigeon. We may have destroyed the bald and golden eagles, the peregrine falcon, many other species of song birds and fish. We are clumsily doing our best to obliterate all nonhuman forms of life on Earth, save maybe plants—and they, too, may have to be sacrificed to parking lots and food synthesized from petroleum wastes or ground-up sewage. And some day someone may wipe us out to clear the ground for a vegetable garden. This book shows how it will be done.

Perhaps the author has struggled with dandelions in a suburban lawn. Perhaps he has seen an ailanthus shoot breaking its way through the pavement of a parking lot or a city street. Maybe he has been impressed by the way in which the jungle envelops and destroys Mayan pyramids and Cambodian temples. In "The Genocides" it happens to all Earth and all the works of Man. The planet is seeded from creatures we never see. Their cultivating machines are active at first, but it isn't necessary for long. And we watch the descent of Man, first into a fragmented society of predatory bands and struggling, patriarchal grubbers, then into a parasitic, almost wormlike dependence on the tree-things they can no longer fight, then—bones.

The book is entirely merciless. It is most like Brian Aldiss' early stories of a far future in which mankind has adapted to a world of dominant plants, but there is no way out here. The destruction of humanity comes almost too quickly . . . but we have ample evidence in history to show what can happen and does happen when hope is lost and Man reverts to the Pliocene ape-thing, *Zinjanthropus*. You hardly like such a book, but it can make you squirm as no harmless space opera will.

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brass tacks

Dear John,

Two of the most serious and intractable problems facing the United States—and the world, for that matter—are an exploding population and structural poverty. And the two are obviously related. And poverty is an hereditary disease. We all know the pattern—poor education leads to unemployability leads to unemployment leads to poverty leads to broken homes leads to illegitimacy leads to cultural deprivation leads to poor education and so on *ad infinitum.* This situation may be deplorable. It is also indubitably a fact.

Boulding, in "The Meaning of the Twentieth Century," half facetiously suggested a solution. I have taken that suggestion and elaborated upon it and given it teeth, and here present it, not at all facetiously, in the manner of Dean Swift, as "A Modest Proposal, Mark II."

Let it first be determined how many children each woman must bear, on the average, to maintain the population level. The Census Bureau and the Insurance companies, among them, could do that easily. For the purposes of this discussion let us assume that the number is two point two.

Let every girl at the age of twelve be assigned twenty-two Birth Credits, or BC's, each one being, in effect, one tenth of a license to bear a child. These BC's would not be any physical token—those can be swiped—but a few bits of information in a computer.

Let these BC's be negotiable—to be bought and sold as simply as TV sets—but on a strictly cash basis.

When a woman has a child, ten BC's will be deducted from her balance. When her balance falls below ten, she will be sterilized, although she may still sell the seven or nine or whatever balance she *does* have. (No honor system here—it wouldn't work!)

A BC market or office could be set up in every major population center, so that a definite market value of the BC would be determined by the usual laws of supply and demand.

Twins and so on could be allowed for in setting up the original BC figure, which might be changed

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from time to time as conditions and public policy demand.

End of "A Modest Proposal, Mark II."

The results of such a program seem obvious—and most of them good. Those that wanted children —and could afford them—would get them. Those who did not want children would be paid for not doing what they didn't want to do anyway. A larger and larger fraction of the total births would be to people who can care for and educate their children, while fewer and fewer would be born into poverty. Even if the very poor sold only the excess two BC's, that group would decline by about ten per cent in one generation, through failure to make up for natural attrition. If, as is more likely, a woman sold more than two, she could have only one child, and the group would be cut in half in one generation.

A bit of elementary probability theory indicates that the most prosperous third of the population would have about fifty-five per cent of the children; the least prosperous third would have eleven per cent; and the middle third would have about a third. In other words, poverty is an hereditary disease—that can be bred out of the country in a couple of generations.

Somebody finds the idea shocking? Does he have a better one?

I shall now retire to my fallout shelter.

JOHN D. CLARK

Tsk! Tsk! You don't understand the economic facts of modern Life and Birth! Actual case, from Aid To Dependent Children case records:

Bertha had produced one bastard per year for seven years, by six different men. The ADC gave her annual increases in "salary"; when she showed up with pregnancy #8, she was collecting more for her "work" for the State than was the college-trained Social Service worker handling her case. Bertha was, then, somewhat better off than the college graduate. So Bertha could afford to invest in BC as necessary expenses to keep her business going, whereas the Social Service girl could not afford to.

The old-fashioned system of population control simply required that the ones who produced 'em, fed 'em —or they starved. Dean Swift's famous "Modest Proposal" simply carried that one logical—but not necessarily rational!—step further.

Your system would lead to some very hasty transfers of BC's from dying females as a first step; the next step would be a tendency toward a rising female-infant mortality.

If murder can be profitable, a variant of Finagle's First Law applies. It will be.

Dear Mr. Campbell:

I participated in a stunt almost exactly the same as Mr. Kemsley's, in my high school physics class in 1954.

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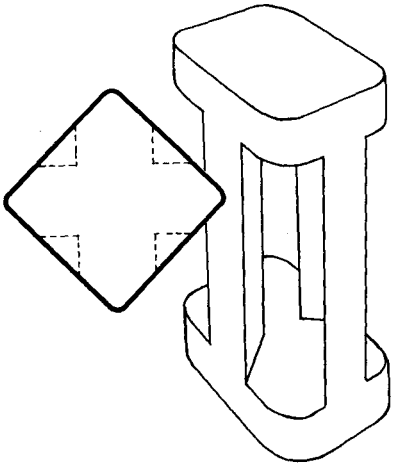
We used four lifters, each of whom would clasp his hands together, with index fingers extended and together. There would be one lifter with his two fingers under each of the subject's arms, and one under each knee. It worked pretty much as Mr. Kemsley related it. Even when two or three of the lifters were girls, they easily lifted a boy weighing 180 pounds (me) as high as their heads.

There was one significant difference, however: instead of pressing down on the subject's head, we would all five breathe deeply in unison, hold the third breath, and lift. So compressing the spine or "sudden release of muscles" isn't necessary—probably hand-clapping or nose-pulling would work as well. I don't know whether it is levitation or not, but maybe it is.

While I'm at it, here is an alternate end view and perspective for the two views of the object you published in March. It shows there are two reasons for using three views: first, to help picture what the thing looks like, and second, to make sure the man who makes it doesn't make something else.



EDWIN L. POWERS
118 Garden Valley
San Antonio, Texas

Perhaps one should concentrate on thinking light thoughts?

Dear Mr. Campbell:

In your editorial in the March, 1966, issue of *Analog* you made several valid points regarding the deficiencies of the workings of government agencies. You would, however, do well to consider two points:

1. The FDA was not set up to encourage the advancement of medical research, but to protect the public from the slightest hint of danger from new and often untried "medicines." It was set up in reaction to, among other things, the uncontrolled use of harmful drugs. It also was meant to force "patent medicine" manufacturers to label their wares accurately and to stop "miracle cure" claims from being used to bilk the public.

   Perhaps it has overreacted to the causes for its conception in too often setting up rules to exclude drugs that are not harmful, but merely unproven, from its approval list. The main point, however, is that a drug manufacturer

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can no longer include branch water or tincture of arsenic in a widely distributed patent medicine—to be taken by just anyone —simply because for some people in some cases they do have some curative properties.

2. Although we should hardly consider drug companies "wicked, nasty (and) money-grubbing," they *are* part of the free-price, private enterprise system that often produces what the public wants rather than what is good for it. A prime example of this is the automobile industry's disregard for safety features in cars because "safety doesn't sell." They're going to create a government agency for the regulation of that facet of commerce, too, and where now we are yelling for the recognition of the compulsory inclusion of safety features in cars, in the future someone like you will write an article about the capriciousness of some of the rules for setting the standards. Let's face it, if we were all like our ideal SciFi heroes who know right from wrong and what's really best for the world, governments would not be necessary, let alone government agencies.

In summary, we are presented a choice between the lesser of two evils when regulatory agencies are first conceived. Then, the choice is always an easy one. What we have to eliminate is not the agency, but the need for its existence, and that would entail reeducating the race in the basic ethic, "Do unto others. . . ."

(MRS.) CHRISTIAN F. HILL
843 East Front Street,
Plainfield, New Jersey

Almost everyone agrees that a Police Department is essential to a community. But this doesn't mean we need a Police State!

Dear Mr. Campbell:

I was tempted to start out with "I know that this is an unusual request" until I realized YOU probably only get that kind. So to the point:

I am studying for the Roman Catholic priesthood as a Paulist Father. I have always been a dedicated reader of science fiction. Most regrettably, I only just discovered Analog. So I have been reading back issues with avid haste the last few months. Hence, I am writing to you about two stories four months apart and well over a year old.

Both have to do with communication. And while *Time,* among others, has typified the Paulists as "communications-minded," the whole Church—by which I mean *all* Christians—is a communications concern. We speak of the "Good News," the "Christian message," "Revelation," and the "Word" in sermons, homilies, missions, classes, lectures, radio and television programs. Our worship is not adulation but two-way, an exchange. Two

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Roman doctrines of prayer express this . . . the "Communion of Saints," and the "Eucharist," reception of which is actually called communicating.

So you can imagine the jolt I got from reading Gordon Dickson's "Dolphin's Way" (vol. 73, no. 4, p. 28) and John T. Phillifent's "Flying Fish" (vol. 74, no. 2, p. 46) on the same day. Both spoke most eloquently of the insufficiency of human verbiage to convey all we would have it do. When one is looking forward to preaching the Ineffable, this strikes home. The Church, itself, is coming to recognize the important role in evangelizing the world that the *form* of worship, music, dance, art, each has. (Sorry about that sentence!)

So I am interested in any such exposition relevant to the idea of *total* communication . . . eventually, to form the basis of a thesis for a degree in Communications. And I would appreciate it if you could suggest any other stories or articles in this vein. Maybe you could put it to your readers, through Brass Tacks.

ROGER L. P. SMITH
St. Paul's College
Washington, D.C. 20017
Reader suggestions wanted!

Dear Sir:

After going through the tensions of the actual Gemini 8 flight, with its potentially fatal complications, "Under the Wide and Starry Sky" put another chill up my spine.

With space investigation involving manned flights, sooner or later just such a malfunction is inevitable, as Mr. Poyer so eloquently stated. The outcome of such a misfortune could break the space program, if its potentiality were not realized beforehand.

The American public should be educated that sooner or later this program will be marred by death, unpalatable a thought as it may be. Regardless of the precautions possible even with infinite resources, that eventuality cannot be avoided.

I believe space exploration is important to mankind, based upon personal reasons not the least of which is that cliché, "for science." We cannot abrogate such a program because of inevitable disagreeable circumstances in its development.

On a less well-defined aspect of science, "The Alchemist" was the most relaxing story I've read in a long time, but paradoxically one of the most thought-provoking.

STANLEY J. PENKALA
4109 Baltimore Avenue,
Philadelphia, Pennsylvania
The American people, who kill tens of thousands of men, women and children every year in automobiles, won't be stopped by a couple of dead astronaut heroes!

Dear Mr. Campbell:

Just reading your Editorial on the Great Blackout in current Ana-

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log, and agree with you in general on your own conclusions. But as a practicing engineer at an emergency generator-equipped station, it strikes me that once again, we have too damned many Rules—and none in critical places.

1. In the pictures I saw of NYC during the blackout, the whole Empire State building was blacked out, including the FM-TV antenna arrays on top. Well, if this happened to me, I would be busy explaining things to an FAA Inspector within twenty-four hours—yet the FAA does not require continuity of service protection on their own premises! It seems inexcusable to me, by the way, that a building the size of the Empire State does not have at least emergency power provisions for the antenna mast and stairwells—not to mention fire pumps. What would have happened had a commercial airliner hit that antenna mast on top? *Whew!!!* A 35 KVA unit would have taken care of things there.
2. Hospitals have the oddest set of standards and regulations you ever saw to adhere to, in order to remain "certified"—whatever that means. Yet, no provision for emergency power. Too many rules about the wrong things, once again.
3. I am beginning to wonder at the thinking of the various engineering staffs of the NYC radio stations that found themselves without studio power, but with the main transmitter running happily on the generator. I suppose that nobody ever gave a thought to the fact that a 2.5 KVA generator at the studio is just as important as the 35 KVA rig at the transmitter. In fact, they could probably get along O.K. on only a little 1 Kw rig at the studio—just enough to operate the console and a tape deck.
4. Ma Bell didn't even "hiccup"—the batteries float on the line, and there is no change at all in operation when AC power goes off. Even the inverted rotary convertors feeding carrier filament supplies start faster than the cathodes can cool off. It does shake one up to see a 3000-0-3000 Amp Ammeter up against the pin on the discharge side of the scale, though. Most Central Offices have about eight-hour capability in batteries—usually much more. All have enough emergency generator capacity to handle the whole gescheft, lights, elevators, DC MG sets, ringing machines, and all.
5. You don't get much "run down power" from motors when the power is cut off—any big enough to deliver much in the line of power to the line from kinetic energy have undervoltage controls on them that drop out on about 90% of normal voltage.

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Even a run-of-the-mill motor starter will let go on about 70% voltage.

6. I think that the problem *is* possible to set up on a computer. It will just take several programs to cover all of the angles. I feel pretty certain that the power companies involved had a pretty good idea of what would happen if they lost a tie line—they just chose to gamble a bit on it never happening!
7. Oh, yes, remote-controlled valves, et cetera almost invariably have some provision to operate them by hand. No insurance company would touch the installation with a ten-foot pole, otherwise.
8. It seems to me that I heard that one of Con Edison's plants got start-up power from a ship. There is plenty of 60 cycle AC power available from any sizable ship, and I never saw a steam plant that didn't have a dock nearby. Here again—we have plenty of Rules about how a Power Station shall be operated, but no requirement for "house power" from an emergency standby generator. Even that would not be necessary, if station house power were taken from their own switchyard. After all, even a shut-down boiler will roll a turbine at .001% of ratings for many hours on just the heat in the boiler setting. In fact, few big turbines are shut down completely—they must be kept turning to avoid shaft warping. If the runner blades touch those in the casing just once—junk! Power or not, a turbine cannot run away—the overspeed trips are strictly mechanical and/or hydraulic: power failure equals immediate shutdown, period. If they have a turbine-driven lube oil pump and are running on it, the main turbine will still "trip out" on overload or overspeed. If not, low lube oil pressure will probably trip it out before anything else. The protective gimmicks on a big turbine are fantastic—and they have to be. As you said, you can't order a turbine "off the shelf."

The whole point seems to have been overlooked in the mad pursuit of the WHY of the Big Blackout, as essentially the same matrix of distribution is again in use, the same power stations, the same "dominos" that toppled so easily. I can't understand why a plan requiring fewer interlinkages is not used—at least a plan with a few gaps in the string of dominos. There is no reason why it can't happen again—and again—and again. As long as the power companies are making their product for a mil a kw and selling it for three cents, they are going to try and keep the game all to themselves.

Me, I'm all for Government ownership—not that the snafus will be any less, but they will then be campaign issues to vote against. If

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Con Edison's holes in NYC streets were chargeable to some city official, how long do you think he'd keep his job? Nope, rigid Government regulation is the only answer —make everybody toe the line, follow the rules, and standardize on oil switch trip timing. What good is overload protection if the feeding-end breaker doesn't trip out first?

I have always wondered what would happen if a power station got an odd number of half-waves of transmission line between itself and a reactive load. It seems fairly obvious that this was highly probable at some time or other during the initial stages of the outage, and may have been a contributing factor, explaining the "surges" of power that tripped everything out.

The puzzling thing is why it took so long to get stations back on the line. With the extreme sectionalizing provisions in all modern power distribution grids, and the fact that all load dispatchers have ready radio communications to their crews, it seems to me that individual power stations could have readily isolated themselves from the grid, and by opening sectionalizing air breaks, have picked up the load gradually—at least in their "home" areas. We may as well relax and enjoy the tsurris—SNAFU is becoming the normal thing, these days!

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Sir, you missed a crucial point on the Great Blackout!

The whole thing started in strictly government owned and operated facilities! *That tie-line deal was the property of the New York State Power Authority.*

Con Edison's holes in the street get filled up fast—because some local householder complains to a local politico who can gain votes by jumping all over Con Ed. But, if any municipal department has a hole in the street—well, that's Government business, and the householder should respect the Government and not always be griping like that. My local street had—due to sewer installations—holes varying up to four feet deep, lasting for four weeks. The loose fill settled after every rainstorm, so that the three-inch puddle of yesterday was a deadly trap two feet deep this morning. Think a privately owned utility would have gotten away with that? Wrecked the power steering on my car, and the entire steering assembly. Think I could collect from the town? Don't be silly!

And computer simulation is impossible—when their theories simply aren't even approximately complete and valid. The best experts in the field don't agree—and the only way they can get the data they need is by having a few more Great Blackouts.

This method of getting data is effective, but not generally looked on with favor.

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EDITORIAL *continued from page 7*

which isn't under their control. Make the questions so tough only a highly skilled lawyer could answer them correctly to "keep all them damn niggers off" and they'll suddenly discover that *they* are being handed those questions to answer—and can't vote! In fact, that the electorate has suddenly been reduced to a number representing approximately one half the membership of the local Bar Association.

Try making the questions so simple that even the illiterate "po' white trash" from the backwoods can pass—and they've just thrown out the literacy requirement themselves.

Such a situation will, obviously, infuriate all prejudiced individuals most woefully. The white bigots who want all Negroes off the rolls can't get that; the equally bigoted racists who want all Negroes on because they *are* Negroes won't get what they want. The computer can't be rigged to select by sex, or religion either—without doing so very openly and publicly.

The other requirement is, of course, that *the complete list of questions in the computer bank must be published by the State Board of Elections.*

Obviously, anyone who wants to vote, then, need only take the time and effort to study the question he's going to be asked—the State itself is providing him with a cram course.

Because, equally obviously, the man who has the desire to study and learn, and can do so, is precisely the type of citizen every state needs on its voter rolls.

And that, of course, will infuriate all demagogic politicians. That is *not* the type of citizen they want on the rolls!

There will, inevitably, be screams that it denies the vote to those who have been deprived of educational opportunities—who are not acculturated to the local cultural norms.

It does. It does indeed. It's intended to.

Voting is restricted to *citizens of the local culture.* That's why there's a residency requirement; you don't get to vote as a member of the group until you've become a member of the group—and why should you? If the local cultural group is a literate society—then become literate, one way or another, or don't expect to vote. You're not competent until you do. In New York City, where there are many thousands of Puerto Ricans who speak little or no English, the literacy test—in English—was heavily attacked because it deprived the Puerto Ricans of the vote.

Why shouldn't it? If the individual can't read, speak, or understand the language of the community, is he competent to make judgments of the community's problems? Perhaps he is indeed a wise, and highly intelligent individual—but in this case he's ignorant, and the ignorant have no business voting until they have repaired their ignorance. And be

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it noted that any wise and intelligent individual can, and will, learn his community's language rapidly.

It makes no difference whatever *why* an individual can't read or write; only the fact of that incompetence has bearing on his unsuitability as a voter. And anyone who has normal intelligence, and a genuine desire to be a member of his community, can learn to read and write in a matter of a few weeks. Sure, his reading and writing may be somewhat less than perfect—but Mexico succeeded, just a few years back, in bringing about a huge increase in literacy on the very simple basis of "Each one teach one," and by distributing comic books widely and cheaply.

In a nation as saturated with comic books for primers, and with individuals who can read and write, there is no validity whatever in saying, "He never had a chance to learn to read and write." Who needs a professionally trained, duly licensed, and state-paid Certified Teacher to learn to read? Did you, personally, learn to read first in school? Or at home, from parents or older siblings? I learned at four, from "Robin Hood and His Merry Men," Howard Pyle edition. I recall my sister learned her first reading from simple observation of traffic signs, and gas-station signs.

In these United States, there is no one who has no opportunity to learn to read and write.

However, since my daughter is teaching Remedial Reading in a major city school system, I have data that there are those for whom "educational opportunity" is properly defined as "activity of the school board—preferably oak or hickory."

The failure of many individuals to learn to read does not truly mean a lack of educational opportunities; it does indicate a lack of educational interest. It is perfectly true that a low-level economy, in a back-country town, definitely does deprive would-be students of educational opportunities with respect to such things as studying microbiology, spectrum analysis, chemical engineering, or computer programming. Those studies absolutely demand the availability of, and access to, costly specialized equipment, and skilled, specialized instructors.

Anyone who says learning to read requires such professional instructors and specialized equipment better take a look at what Mexican communities did *for themselves.* And meanwhile, stop preaching their great doctrine, based primarily on abysmal ignorance.

However, as I say, the notion of having the absolutely unbiased services of an electronic computer determine whether any given individual is competent to vote would be extremely unpopular with practically all groups.

I have long felt that the main reason people put Truth on such a high pedestal is to avoid the danger of accidentally running into it.

The Editor

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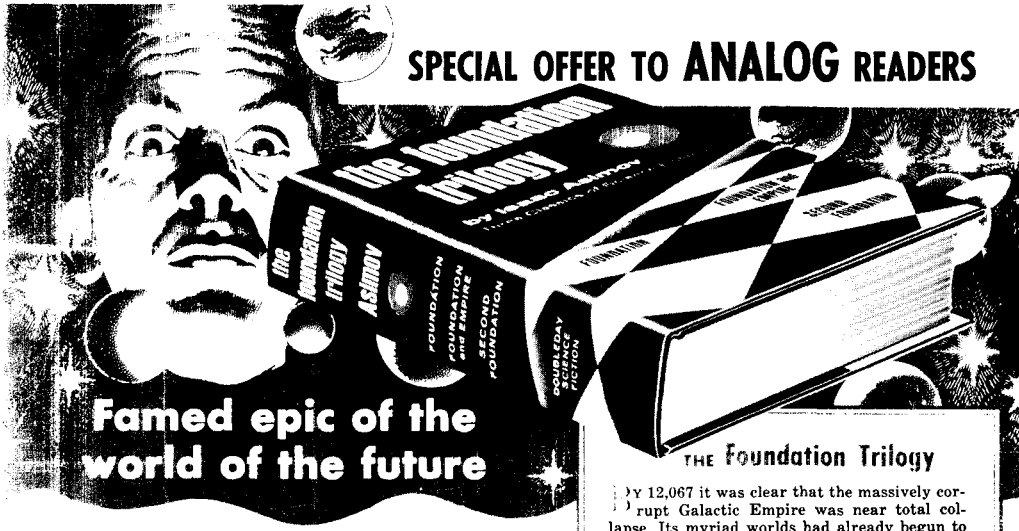

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